Form CCR 1

Illinois Environmental Protection Agency

CCR Residual Surface Impoundment Permit Application

CCR Form 1 – General Provisions

Bureau of Water ID Number:

a

CCR Permit Number:

Facility Name: Will County Generating Station

For IEPA Use Only

SECTION 1: FACILITY, OPERATOR, AND OWNER INFORMATION (35 IAC 845.210(b))

Facility, Operator, and Owner Information

1.1 Facility Name

Will County Generating Station

1.2 Illinois EPA CCR Permit Number (if applicable)

Initial Permit

1.3 Facility Contact Information

Name (first and last) James Thorne	Title Environmental, H&S Specialist	Phone Number 815-671-3397

Email address
James.Thorne@NRG.com

1.4 Facility Mailing Address

Street or P.O. box
529 E. Romeo Road

City or town Romeoville	State Illinois	Zip Code 60446

1.5 Facility Location

Street, route number, or other specific identifier
529 E. Romeo Road

County name Will	County code (if known)	
City or town Romeoville	State Illinois	Zip Code 60446

1.6 Name of Owner/Operator

Midwest Generation, LLC

Facility, Operator, and Owner Info

1.7 Owner/Operator Contact Information

Name (first and last): Phillip Raush

Title: Plant Manager

Phone Number: 815-372-4512

Email address: phillip.raush@nrg.com

1.8 Owner/Operator Mailing Address

Street or P.O. box: 804 Carnegie Center

City or town: Princeton

State: New Jersey

Zip Code: 08540

SECTION 2: LEGAL DESCRIPTION (35 IAC 845.210(c))

Legal Description

2.1 Legal Description of the facility boundary

ALL THT PRT OF THE SE1/4 OF SEC 19, T35N-R10E., LYING S'LY OF THE CENTERLINE OF CHANNAHON RD; NW'LY OF A LINE DESCRIBED AS COMM AT THE SW COR OF THE SE1/4 OF SD SEC 19; THC RUNNING E ON THE S LN OF SD SEC 1629 FT; THC N 41 DEG 22' E, 249.3 FT; THC N 47 DEG 46' E, 587.6 FT; THC N 53 DEG 5' 30" E, 371.1 FT; THC N 64 DEG 28' 30" E, 545.9 FT TO A PT ON THE E LN OF SD SEC 19, WHICH IS 709.6 FT S OF THE CENTERLINE OF THE PUBLIC HIGHWAY KNOWN AS CHANNAHON RD. (EX THT PRT TAKEN BY THE STATE OF ILLINOIS BY DOC# R68-013815) & (EX THEREFROM THE FOLLOWING DESCRIBED PARCEL TO WIT; THT PRT OF THE SE1/4 OF SEC 19, T35N-R10E. DAF: COMM AT A PT ON THE S LN OF SD SEC 19, BEING A CONCRETE MONUMENT 1963.03 FT (RECORD) EAST (AS MEASURED ALG THE SOUTH LN OF SD SEC 19) OF THE SW COR OF SD SEC 19 SD MONUMENT BEING ON THE BOUNDARY LN PER THE BOUNDARY LN AGREEMENT RECORDED MARCH 21, 1951 AS DOC # 688037 BETWEEN CATERPILLAR TRACTOR CO. & PUBLIC SERVICE CO. OF NORTHERN ILLINOIS; THC N 01 DEG 48' 09" W ALG THE SD BOUNDARY LN 594.54 FT; THC N 73 DEG 47' 26" E ALG THE S ROW OF RTE 6 (FORMERLY KNOWN AS CHANNAHON RD) AS HERETOFORE CONVEYED TO THE STATE OF ILLINOIS PER QUIT CLAIM AUGUST 19. 1968 AS DOC# R68-13815, A DIST OF 870.57 FT TO A PT OF CURVATURE; THC E'LY ALG THE ARC OF CURVE CONCAVE TO THE NORTH, BEING THE S ROW LN OF SD RTE 6, HAVING A RADIUS OF 38,307.20 FT, HAVING A CHORD BEARING OF N 73 DEG 38' 36" E, 196.99 FT FOR A POB; THC CONT E'LY ALG THE ARC OF A CURVE CONCAVE TO THE N, BEING THE SD S'LY ROW LN OF RTE 6, HAVING A RADIUS OF 38,307.20 FT, HAVING A CHORD BEARING OF N 72 DEG 43' 48" E, 1024.21 FT; THC S 37 DEG 17' 59" E, 391.37 FT; THC S 42 DEG 57' 20" W, 785.70 FT; THC N 55 DEG 05' 38" W, 553.84 FT; THC N 40 DEG 21' 51" W, 348.30 FT TO THE POB. NEW PARCEL ASSESSMENT DESCRIPTION NDA:

SECTION 3: PUBLICLY ACCESSIBLE INTERNET SITE REQUIREMENTS (35 IAC 845.810)

Internet Site

3.1 Web Address(es) to publicly accessible internet site(s) (CCR website)

https://midwestgenerationllc.com/illinois-ccr-rule-compliance-data-and-information/

3.2 Is/are the website(s) titled “Illinois CCR Rule Compliance Data and Information”

Yes No

SECTION 4: IMPOUNDMENT IDENTIFICATION

Impoundment Identification

4.1 List all the Impoundment Identification numbers for your facility and check the corresponding box to indicate that you have attached a written description for each impoundment.

W1978100011-01	☑	Attached written description
W1978100011-02	☑	Attached written description
W1978100011-3	☑	Attached written description
W1978100011-4	☑	Attached written description
	☐	Attached written description
	☐	Attached written description
	☐	Attached written description

		☐	Attached written description
		☐	Attached written description
		☐	Attached written description

SECTION 5: CHECKLIST AND CERTIFICATION STATEMENT

Checklist and Certification Statement

5.1 In Colum 1 below, mark the sections of Form 1 that you have completed and are submitting with your application. For each section, specify in Column 2 any attachments that you are enclosing.

Column 1		**Column 2**	
Section 1: Facility, Operator, and Owner Information	☑	w/attachments	☑
Section 2: Legal Description	☑	w/attachments	☐
Section 3: Publicly Accessible Internet Site Requirement	☑	w/attachments	☐
Section 4: Impoundment Identification	☑	w/attachments	☑

5.2 **Certification Statement**

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Name (print or type first and last name) of Owner/Operator Phillip Raush	Official Title Plant Manager
Signature PJ Raush	Date Signed 07/31/23

Form 2CC

Illinois Environmental Protection Agency

CCR Surface Impoundment Permit Application

Form CCR 2CC – Closure Construction

Bureau of Water ID Number:

CCR Permit Number:

Facility Name:

Will County Generating Station

For IEPA Use Only

SECTION 1: DESIGN AND CONSTRUCTION PLANS (35 Ill. Adm. Code 845.220)

Design and Construction Plans (Construction History)

1.1 CCR surface impoundment name.

Pond 1 North

1.2 Identification number of the CCR surface impoundment (if one has been assigned by the Agency).

1978100011-01

1.3 Describe the boundaries of the CCR surface impoundment (35 Ill. Adm. Code 845.210 (c)).

ALL THT PRT OF THE SE1/4 OF SEC 19, T35N-R10E., LYING S'LY OF THE CENTERLINE OF CHANNAHON RD; NW'LY OF A LINE DESCRIBED AS COMM AT THE SW COR OF THE SE1/4 OF SD SEC 19; THC RUNNING E ON THE S LN OF SD SEC 1629 FT; THC N 41 DEG 22' E, 249.3 FT; THC N 47 DEG 46' E, 587.6 FT; THC N 53 DEG 5' 30" E, 371.1 FT; THC N 64 DEG 28' 30" E, 545.9 FT TO A PT ON THE E LN OF SD SEC 19, WHICH IS 709.6 FT S OF THE CENTERLINE OF THE PUBLIC HIGHWAY KNOWN AS CHANNAHON RD. (EX THT PRT TAKEN BY THE STATE OF ILLINOIS BY DOC# R68-013815) & (EX THEREFROM THE FOLLOWING DESCRIBED PARCEL TO WIT; THT PRT OF THE SE1/4 OF SEC 19, T35N-R10E. DAF: COMM AT A PT ON THE S LN OF SD SEC 19, BEING A CONCRETE MONUMENT 1963.03 FT (RECORD) EAST (AS MEASURED ALG THE SOUTH LN OF SD SEC 19) OF THE SW COR OF SD SEC 19 SD MONUMENT BEING ON THE BOUNDARY LN PER THE BOUNDARY LN AGREEMENT RECORDED MARCH 21, 1951 AS DOC # 688037 BETWEEN CATERPILLAR TRACTOR CO. & PUBLIC SERVICE CO. OF NORTHERN ILLINOIS; THC N 01 DEG 48' 09" W ALG THE SD BOUNDARY LN 594.54 FT; THC N 73 DEG 47' 26" E ALG THE S ROW OF RTE 6 (FORMERLY KNOWN AS CHANNAHON RD) AS HERETOFORE CONVEYED TO THE STATE OF ILLINOIS PER QUIT CLAIM AUGUST 19. 1968 AS DOC# R68-13815, A DIST OF 870.57 FT TO A PT OF CURVATURE; THC E'LY ALG THE ARC OF CURVE CONCAVE TO THE NORTH, BEING THE S ROW LN OF SD RTE 6, HAVING A RADIUS OF 38,307.20 FT, HAVING A CHORD BEARING OF N 73 DEG 38' 36" E, 196.99 FT FOR A POB; THC CONT E'LY ALG THE ARC OF A CURVE CONCAVE TO THE N, BEING THE SD S'LY ROW LN OF RTE 6, HAVING A RADIUS OF 38,307.20 FT, HAVING A CHORD BEARING OF N 72 DEG 43' 48" E, 1024.21 FT; THC S 37 DEG 17' 59" E, 391.37 FT; THC S 42 DEG 57' 20" W, 785.70 FT; THC N 55 DEG 05' 38" W, 553.84 FT; THC N 40 DEG 21' 51" W, 348.30 FT TO THE POB. NEW PARCEL ASSESSMENT DESCRIPTION NDA:

1.4 State the purpose for which the CCR surface impoundment is being used.

Used as a settling pond for sluiced CCR and other process waters associated with the electrical power generating process

1.5 How long has the CCR surface impoundment been in operation?

approximately 31 years

1.6 List the types of CCR that have been placed in the CCR surface impoundment.

bottom ash and economizer ash

Design and Construction Plans (Continued)		
	1.7	List the name of the watershed within which the CCR surface impoundment is located.
		Des Plaines River
	1.8	What is the size in acres of the watershed within which the CCR surface impoundment is located?
		28,808
	1.9	Check the corresponding boxes to indicate that you have attached the following:
		☑ A description of the physical and engineering properties of the foundation and abutment materials on which the CCR surface impoundment is constructed.
		☑ A statement of the type, size, range, and physical and engineering properties of the materials used in constructing each zone or stage of the CCR surface impoundment.
		☑ A statement of the method of site preparation and construction of each zone of the CCR surface impoundment.
		☑ A statement of the approximate dates of construction of each successive stage of construction of the CCR surface impoundment.
		☑ Drawings satisfying the requirements of 35 Ill. Adm. Code 845.220(a)(1)(F).
		☑ A description of the type, purpose, and location of existing instrumentation.
		☑ Area capacity curves for the CCR impoundment.
		☑ A description of each spillway and diversion design features and capacities and provide the calculations used in their determination.
		☑ The construction specifications and provisions for surveillance, maintenance, and repair of the CCR surface impoundment.
	1.10.1	Is there any record or knowledge of structural instability of the CCR surface impoundment?
		☐ Yes ☑ No
	1.10.2	If you answered yes to Item 1.10.1, provide detailed explanation of the structural instability.
		NA

SECTION 2: NARRATIVE DESCRIPTION OF THE FACILITY (35 Ill. Adm. Code 845.220)

Narrative Description

2.1 List the types of CCR expected in the CCR surface impoundments.

No new CCR is expected. The pond holds bottom ash and economizer ash

2.2 Have you attached a chemical analysis of each type of expected CCR?

☑ Yes

2.3 Estimate of the maximum capacity of the surface impoundment in gallons or cubic yards.

22,680 cubic yards

2.4 The rate at which CCR and non-CCR waste streams currently enter the CCR impoundment in gallons per day and dry tons.

0	GPD	0	dTn

2.5 Estimate length of time the CCR surface impoundment will receive CCR and non-CCR waste streams.

The impoundment is out of service

2.6 Have you attached an on-site transportation plan that includes all existing and planned roads in the facility that will be used during the operation of the CCR surface impoundment?

☑ Yes

SECTION 3: MAPS (35 Ill. Adm. Code 845.220)

Maps

3.1 Check the corresponding boxes to indicate that you have attached the following maps:

☑ A site location map on the most recent United Sates Geological Survey (USGS) quadrangle of the area from the 7 ½ minute series (topographic) or on another map whose scale clearly shows the information required in 35 Ill. Adm. Code 845.220(a)(3).

☑ Site plans maps satisfying the requirements of 35 Ill. Adm. Code 845.220(a)(4).

SECTION 4: ATTACHMENTS

Attachments

4.1 Check the corresponding boxes to indicate that you have attached the following:

☑ A narrative description of the proposed construction of, or modification to, a CCR surface impoundment and any projected changes in the volume or nature of the CCR or non-CCR waste streams.

☑ Plans and specifications fully describing the design, nature, function, and interrelationship of each individual component of the facility.

☑ The signature and seal of a qualified professional engineer.

☑ Certification that the owner or operator of the CCR surface impoundment completed the public notification and public meetings required under 35 Ill. Adm. Code 845.240.

Attachments (Continued)		☑	A summary of the issues raised by the public during the public notification and public meetings.
		☑	A summary of any revisions, determinations, or other considerations made in response to those issues raised by the public during the public notification and public meetings.
		☑	A list of interested persons in attendance who would like to be added to the Agency's listserv for the facility.
		☑	Certification that all contractors, subcontractors, and installers utilized to construct, install, modify, or close a CCR surface impoundment are participants in a training program that is approved by and registered with the U.S. Department of Labor's Employment and Training Administration and that includes instruction in erosion control and environmental remediation.
		☑	Certification that all contractors, subcontractors, and installers utilized to construct, install, modify, or close a CCR surface impoundment are participants in a training program that is approved by and registered with the U.S. Department of Labor's Employment and Training Administration and that includes instruction in the operation of heavy equipment and excavation.

SECTION 5: GROUNDWATER MONITORING PROGRAM

Groundwater Monitoring	5.1	Indicate that you have attached the following components of a new groundwater monitoring program or any modifications to an existing groundwater monitoring program by checking the corresponding boxes:	
		☑	A hydrogeologic site investigation meeting the requirements of 35 Ill. Adm. Code 845.620, if applicable.
		☑	Design and construction plans of a groundwater monitoring system meeting the requirements of 35 Ill. Adm. Code 845.630.
		☑	A proposed groundwater sampling and analysis program that includes selection of the statistical procedures to be used for evaluating groundwater monitoring data as required by 35 Ill. Adm. Code 845.640 and 845.650.

SECTION 6: CLOSURE (35 Ill. Adm. Code 845.220(d))

Closure	6.1	What is the closure prioritization category under 35 Ill. Adm. Code 845.700(g), if applicable?	
		Category 6	
	6.2	Indicate that you have attached the following by checking the corresponding boxes:	
		☑	The final closure plan, as specified in 35 Ill. Adm. Code 845.720(b), which includes the closure alternatives analysis required by 35 Ill. Adm. Code 845.710.
		☑	Proposed schedule to complete closure.
		☑	Post-closure care plan as specified in 35 Ill. Adm. Code 845.780(d).

SECTION 7: GROUNDWATER MODELING (35 Ill. Adm. Code 845.220(d)(3))

Groundwater	7.1	Indicate that you have attached the following by checking the corresponding boxes:	
		☑	The results of groundwater contaminant transport modeling and calculations showing how the closure will achieve compliance with the applicable groundwater standards.
		☑	All modeling inputs and assumptions.
		☑	Description of the fate and transport of contaminants with the selected corrective action over time.

		☑	Capture zone modeling, if applicable.
		☑	Any necessary licenses and software needed to review and access both the model and the data contained within the model.

Form 2CC

Illinois Environmental Protection Agency

CCR Surface Impoundment Permit Application

Form CCR 2CC – Closure Construction

Bureau of Water ID Number:

CCR Permit Number:

Facility Name:

Will County Generating Station

For IEPA Use Only

SECTION 1: DESIGN AND CONSTRUCTION PLANS (35 Ill. Adm. Code 845.220)

Design and Construction Plans (Construction History)

1.1 CCR surface impoundment name.

Pond 1 South

1.2 Identification number of the CCR surface impoundment (if one has been assigned by the Agency).

1978100011-02

1.3 Describe the boundaries of the CCR surface impoundment (35 Ill. Adm. Code 845.210 (c)).

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1.4 State the purpose for which the CCR surface impoundment is being used.

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approximately 31 years

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bottom ash and economizer ash

Design and Construction Plans (Continued)		
	1.7	List the name of the watershed within which the CCR surface impoundment is located.
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Narrative Description

2.1 List the types of CCR expected in the CCR surface impoundments.

No new CCR is expected. The pond holds bottom ash and economizer ash

2.2 Have you attached a chemical analysis of each type of expected CCR?

☑ Yes

2.3 Estimate of the maximum capacity of the surface impoundment in gallons or cubic yards.

20,380 cubic yards

2.4 The rate at which CCR and non-CCR waste streams currently enter the CCR impoundment in gallons per day and dry tons.

0	GPD	0	dTn

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The impoundment is out of service

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Form 2CC

Illinois Environmental Protection Agency

CCR Surface Impoundment Permit Application

Form CCR 2CC – Closure Construction

Bureau of Water ID Number:

CCR Permit Number:

Facility Name:

Will County Generating Station

For IEPA Use Only

SECTION 1: DESIGN AND CONSTRUCTION PLANS (35 Ill. Adm. Code 845.220)

Design and Construction Plans (Construction History)

1.1 CCR surface impoundment name.

Pond 2 South

1.2 Identification number of the CCR surface impoundment (if one has been assigned by the Agency).

1978100011-03

1.3 Describe the boundaries of the CCR surface impoundment (35 Ill. Adm. Code 845.210 (c)).

ALL THT PRT OF THE SE1/4 OF SEC 19, T35N-R10E., LYING S'LY OF THE CENTERLINE OF CHANNAHON RD; NW'LY OF A LINE DESCRIBED AS COMM AT THE SW COR OF THE SE1/4 OF SD SEC 19; THC RUNNING E ON THE S LN OF SD SEC 1629 FT; THC N 41 DEG 22' E, 249.3 FT; THC N 47 DEG 46' E, 587.6 FT; THC N 53 DEG 5' 30" E, 371.1 FT; THC N 64 DEG 28' 30" E, 545.9 FT TO A PT ON THE E LN OF SD SEC 19, WHICH IS 709.6 FT S OF THE CENTERLINE OF THE PUBLIC HIGHWAY KNOWN AS CHANNAHON RD. (EX THT PRT TAKEN BY THE STATE OF ILLINOIS BY DOC# R68-013815) & (EX THEREFROM THE FOLLOWING DESCRIBED PARCEL TO WIT; THT PRT OF THE SE1/4 OF SEC 19, T35N-R10E. DAF: COMM AT A PT ON THE S LN OF SD SEC 19, BEING A CONCRETE MONUMENT 1963.03 FT (RECORD) EAST (AS MEASURED ALG THE SOUTH LN OF SD SEC 19) OF THE SW COR OF SD SEC 19 SD MONUMENT BEING ON THE BOUNDARY LN PER THE BOUNDARY LN AGREEMENT RECORDED MARCH 21, 1951 AS DOC # 688037 BETWEEN CATERPILLAR TRACTOR CO. & PUBLIC SERVICE CO. OF NORTHERN ILLINOIS; THC N 01 DEG 48' 09" W ALG THE SD BOUNDARY LN 594.54 FT; THC N 73 DEG 47' 26" E ALG THE S ROW OF RTE 6 (FORMERLY KNOWN AS CHANNAHON RD) AS HERETOFORE CONVEYED TO THE STATE OF ILLINOIS PER QUIT CLAIM AUGUST 19. 1968 AS DOC# R68-13815, A DIST OF 870.57 FT TO A PT OF CURVATURE; THC E'LY ALG THE ARC OF CURVE CONCAVE TO THE NORTH, BEING THE S ROW LN OF SD RTE 6, HAVING A RADIUS OF 38,307.20 FT, HAVING A CHORD BEARING OF N 73 DEG 38' 36" E, 196.99 FT FOR A POB; THC CONT E'LY ALG THE ARC OF A CURVE CONCAVE TO THE N, BEING THE SD S'LY ROW LN OF RTE 6, HAVING A RADIUS OF 38,307.20 FT, HAVING A CHORD BEARING OF N 72 DEG 43' 48" E, 1024.21 FT; THC S 37 DEG 17' 59" E, 391.37 FT; THC S 42 DEG 57' 20" W, 785.70 FT; THC N 55 DEG 05' 38" W, 553.84 FT; THC N 40 DEG 21' 51" W, 348.30 FT TO THE POB. NEW PARCEL ASSESSMENT DESCRIPTION NDA:

1.4 State the purpose for which the CCR surface impoundment is being used.

Used as a settling pond for sluiced CCR and other process waters associated with the electrical power generating process

1.5 How long has the CCR surface impoundment been in operation?

approximately 43 years

1.6 List the types of CCR that have been placed in the CCR surface impoundment.

bottom ash and economizer ash

Design and Construction Plans (Continued)			
	1.7	List the name of the watershed within which the CCR surface impoundment is located.	
		Des Plaines River	
	1.8	What is the size in acres of the watershed within which the CCR surface impoundment is located?	
		28,808	
	1.9	Check the corresponding boxes to indicate that you have attached the following:	
		☑	A description of the physical and engineering properties of the foundation and abutment materials on which the CCR surface impoundment is constructed.
		☑	A statement of the type, size, range, and physical and engineering properties of the materials used in constructing each zone or stage of the CCR surface impoundment.
		☑	A statement of the method of site preparation and construction of each zone of the CCR surface impoundment.
		☑	A statement of the approximate dates of construction of each successive stage of construction of the CCR surface impoundment.
		☑	Drawings satisfying the requirements of 35 Ill. Adm. Code 845.220(a)(1)(F).
		☑	A description of the type, purpose, and location of existing instrumentation.
		☑	Area capacity curves for the CCR impoundment.
		☑	A description of each spillway and diversion design features and capacities and provide the calculations used in their determination.
		☑	The construction specifications and provisions for surveillance, maintenance, and repair of the CCR surface impoundment.
	1.10.1	Is there any record or knowledge of structural instability of the CCR surface impoundment?	
		☐ Yes ☑ No	
	1.10.2	If you answered yes to Item 1.10.1, provide detailed explanation of the structural instability.	
		NA	

SECTION 2: NARRATIVE DESCRIPTION OF THE FACILITY (35 Ill. Adm. Code 845.220)

Narrative Description

2.1 List the types of CCR expected in the CCR surface impoundments.

No new CCR is expected. The pond holds bottom ash and economizer ash

2.2 Have you attached a chemical analysis of each type of expected CCR?

☑ Yes

2.3 Estimate of the maximum capacity of the surface impoundment in gallons or cubic yards.

21,300 cubic yards

2.4 The rate at which CCR and non-CCR waste streams currently enter the CCR impoundment in gallons per day and dry tons.

0	GPD	0	dTn

2.5 Estimate length of time the CCR surface impoundment will receive CCR and non-CCR waste streams.

The impoundment is out of service

2.6 Have you attached an on-site transportation plan that includes all existing and planned roads in the facility that will be used during the operation of the CCR surface impoundment?

☑ Yes

SECTION 3: MAPS (35 Ill. Adm. Code 845.220)

Maps

3.1 Check the corresponding boxes to indicate that you have attached the following maps:

☑ A site location map on the most recent United Sates Geological Survey (USGS) quadrangle of the area from the 7 ½ minute series (topographic) or on another map whose scale clearly shows the information required in 35 Ill. Adm. Code 845.220(a)(3).

☑ Site plans maps satisfying the requirements of 35 Ill. Adm. Code 845.220(a)(4).

SECTION 4: ATTACHMENTS

Attachments

4.1 Check the corresponding boxes to indicate that you have attached the following:

☑ A narrative description of the proposed construction of, or modification to, a CCR surface impoundment and any projected changes in the volume or nature of the CCR or non-CCR waste streams.

☑ Plans and specifications fully describing the design, nature, function, and interrelationship of each individual component of the facility.

☑ The signature and seal of a qualified professional engineer.

☑ Certification that the owner or operator of the CCR surface impoundment completed the public notification and public meetings required under 35 Ill. Adm. Code 845.240.

Attachments (Continued)		☑	A summary of the issues raised by the public during the public notification and public meetings.
		☑	A summary of any revisions, determinations, or other considerations made in response to those issues raised by the public during the public notification and public meetings.
		☑	A list of interested persons in attendance who would like to be added to the Agency's listserv for the facility.
		☑	Certification that all contractors, subcontractors, and installers utilized to construct, install, modify, or close a CCR surface impoundment are participants in a training program that is approved by and registered with the U.S. Department of Labor’s Employment and Training Administration and that includes instruction in erosion control and environmental remediation.
		☑	Certification that all contractors, subcontractors, and installers utilized to construct, install, modify, or close a CCR surface impoundment are participants in a training program that is approved by and registered with the U.S. Department of Labor’s Employment and Training Administration and that includes instruction in the operation of heavy equipment and excavation.

SECTION 5: GROUNDWATER MONITORING PROGRAM

Groundwater Monitoring	5.1	Indicate that you have attached the following components of a new groundwater monitoring program or any modifications to an existing groundwater monitoring program by checking the corresponding boxes:	
		☑	A hydrogeologic site investigation meeting the requirements of 35 Ill. Adm. Code 845.620, if applicable.
		☑	Design and construction plans of a groundwater monitoring system meeting the requirements of 35 Ill. Adm. Code 845.630.
		☑	A proposed groundwater sampling and analysis program that includes selection of the statistical procedures to be used for evaluating groundwater monitoring data as required by 35 Ill. Adm. Code 845.640 and 845.650.

SECTION 6: CLOSURE (35 Ill. Adm. Code 845.220(d))

Closure	6.1	What is the closure prioritization category under 35 Ill. Adm. Code 845.700(g), if applicable?	
		Category 7	
	6.2	Indicate that you have attached the following by checking the corresponding boxes:	
		☑	The final closure plan, as specified in 35 Ill. Adm. Code 845.720(b), which includes the closure alternatives analysis required by 35 Ill. Adm. Code 845.710.
		☑	Proposed schedule to complete closure.
		☑	Post-closure care plan as specified in 35 Ill. Adm. Code 845.780(d).

SECTION 7: GROUNDWATER MODELING (35 Ill. Adm. Code 845.220(d)(3))

Groundwater	7.1	Indicate that you have attached the following by checking the corresponding boxes:	
		☑	The results of groundwater contaminant transport modeling and calculations showing how the closure will achieve compliance with the applicable groundwater standards.
		☑	All modeling inputs and assumptions.
		☑	Description of the fate and transport of contaminants with the selected corrective action over time.

		☑	Capture zone modeling, if applicable.
		☑	Any necessary licenses and software needed to review and access both the model and the data contained within the model.

Form 2CC

Illinois Environmental Protection Agency

CCR Surface Impoundment Permit Application

Form CCR 2CC – Closure Construction

Bureau of Water ID Number:

CCR Permit Number:

Facility Name:

Will County Generating Station

For IEPA Use Only

SECTION 1: DESIGN AND CONSTRUCTION PLANS (35 Ill. Adm. Code 845.220)

Design and Construction Plans (Construction History)

1.1 CCR surface impoundment name.

Pond 3 South

1.2 Identification number of the CCR surface impoundment (if one has been assigned by the Agency).

1978100011-02

1.3 Describe the boundaries of the CCR surface impoundment (35 Ill. Adm. Code 845.210 (c)).

ALL THT PRT OF THE SE1/4 OF SEC 19, T35N-R10E., LYING S'LY OF THE CENTERLINE OF CHANNAHON RD; NW'LY OF A LINE DESCRIBED AS COMM AT THE SW COR OF THE SE1/4 OF SD SEC 19; THC RUNNING E ON THE S LN OF SD SEC 1629 FT; THC N 41 DEG 22' E, 249.3 FT; THC N 47 DEG 46' E, 587.6 FT; THC N 53 DEG 5' 30" E, 371.1 FT; THC N 64 DEG 28' 30" E, 545.9 FT TO A PT ON THE E LN OF SD SEC 19, WHICH IS 709.6 FT S OF THE CENTERLINE OF THE PUBLIC HIGHWAY KNOWN AS CHANNAHON RD. (EX THT PRT TAKEN BY THE STATE OF ILLINOIS BY DOC# R68-013815) & (EX THEREFROM THE FOLLOWING DESCRIBED PARCEL TO WIT; THT PRT OF THE SE1/4 OF SEC 19, T35N-R10E. DAF: COMM AT A PT ON THE S LN OF SD SEC 19, BEING A CONCRETE MONUMENT 1963.03 FT (RECORD) EAST (AS MEASURED ALG THE SOUTH LN OF SD SEC 19) OF THE SW COR OF SD SEC 19 SD MONUMENT BEING ON THE BOUNDARY LN PER THE BOUNDARY LN AGREEMENT RECORDED MARCH 21, 1951 AS DOC # 688037 BETWEEN CATERPILLAR TRACTOR CO. & PUBLIC SERVICE CO. OF NORTHERN ILLINOIS; THC N 01 DEG 48' 09" W ALG THE SD BOUNDARY LN 594.54 FT; THC N 73 DEG 47' 26" E ALG THE S ROW OF RTE 6 (FORMERLY KNOWN AS CHANNAHON RD) AS HERETOFORE CONVEYED TO THE STATE OF ILLINOIS PER QUIT CLAIM AUGUST 19. 1968 AS DOC# R68-13815, A DIST OF 870.57 FT TO A PT OF CURVATURE; THC E'LY ALG THE ARC OF CURVE CONCAVE TO THE NORTH, BEING THE S ROW LN OF SD RTE 6, HAVING A RADIUS OF 38,307.20 FT, HAVING A CHORD BEARING OF N 73 DEG 38' 36" E, 196.99 FT FOR A POB; THC CONT E'LY ALG THE ARC OF A CURVE CONCAVE TO THE N, BEING THE SD S'LY ROW LN OF RTE 6, HAVING A RADIUS OF 38,307.20 FT, HAVING A CHORD BEARING OF N 72 DEG 43' 48" E, 1024.21 FT; THC S 37 DEG 17' 59" E, 391.37 FT; THC S 42 DEG 57' 20" W, 785.70 FT; THC N 55 DEG 05' 38" W, 553.84 FT; THC N 40 DEG 21' 51" W, 348.30 FT TO THE POB. NEW PARCEL ASSESSMENT DESCRIPTION NDA:

1.4 State the purpose for which the CCR surface impoundment is being used.

Used as a settling pond for sluiced CCR and other process waters associated with the electrical power generating process

1.5 How long has the CCR surface impoundment been in operation?

approximately 42 years

1.6 List the types of CCR that have been placed in the CCR surface impoundment.

bottom ash and economizer ash

Design and Construction Plans (Continued)

1.7	List the name of the watershed within which the CCR surface impoundment is located.
	Des Plaines River
1.8	What is the size in acres of the watershed within which the CCR surface impoundment is located?
	28,808 acres
1.9	Check the corresponding boxes to indicate that you have attached the following:
	☑ A description of the physical and engineering properties of the foundation and abutment materials on which the CCR surface impoundment is constructed.
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1.10.1	Is there any record or knowledge of structural instability of the CCR surface impoundment?
	☐ Yes ☑ No
1.10.2	If you answered yes to Item 1.10.1, provide detailed explanation of the structural instability.
	NA

SECTION 2: NARRATIVE DESCRIPTION OF THE FACILITY (35 Ill. Adm. Code 845.220)

Narrative Description

2.1 List the types of CCR expected in the CCR surface impoundments.

No new CCR is expected. The pond holds bottom ash and economizer ash

2.2 Have you attached a chemical analysis of each type of expected CCR?

☑ Yes

2.3 Estimate of the maximum capacity of the surface impoundment in gallons or cubic yards.

24,400 cubic yards

2.4 The rate at which CCR and non-CCR waste streams currently enter the CCR impoundment in gallons per day and dry tons.

0	GPD	0	dTn

2.5 Estimate length of time the CCR surface impoundment will receive CCR and non-CCR waste streams.

The impoundment is out of service

2.6 Have you attached an on-site transportation plan that includes all existing and planned roads in the facility that will be used during the operation of the CCR surface impoundment?

☑ Yes

SECTION 3: MAPS (35 Ill. Adm. Code 845.220)

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☑ The signature and seal of a qualified professional engineer.

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Attachments (Continued)		☑	A summary of the issues raised by the public during the public notification and public meetings.
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SECTION 6: CLOSURE (35 Ill. Adm. Code 845.220(d))

Closure	6.1	What is the closure prioritization category under 35 Ill. Adm. Code 845.700(g), if applicable?	
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		☑	Post-closure care plan as specified in 35 Ill. Adm. Code 845.780(d).

SECTION 7: GROUNDWATER MODELING (35 Ill. Adm. Code 845.220(d)(3))

Groundwater	7.1	Indicate that you have attached the following by checking the corresponding boxes:	
		☑	The results of groundwater contaminant transport modeling and calculations showing how the closure will achieve compliance with the applicable groundwater standards.
		☑	All modeling inputs and assumptions.
		☑	Description of the fate and transport of contaminants with the selected corrective action over time.

		☑	Capture zone modeling, if applicable.
		☑	Any necessary licenses and software needed to review and access both the model and the data contained within the model.

KPRG

ENVIRONMENTAL CONSULTATION & REMEDIATION

KPRG and Associates, Inc.

APPLICATION FOR CLOSURE CONSTRUCTION PERMIT

WILL COUNTY STATION
MIDWEST GENERATION, LLC
525 OLD ROMEO RD
ROMEOVILLE, ILLINOIS

Illinois EPA Site No. W1978100011

August 1, 2023

Submitted To:

Illinois Environmental Protection Agency
1021 North Grand Avenue East
Springfield, Illinois 62702

Prepared For:

Midwest Generation, LLC
529 E. Romeo Road
Romeoville, IL 60446

Prepared By:

KPRG and Associates, Inc.
14665 West Lisbon Road, Suite 1A
Brookfield, WI 53005

Table of Contents

TABLES

FIGURES

ATTACHMENTS

Introduction

Midwest Generation, LLC (Midwest Generation) previously operated the coal-fired steam electric generating station, referred to as Will County Station, located in Romeoville, Illinois ("site" or "station"). The station ceased electrical generation on June 10, 2022. As part of the coal-fired operations and managing the coal combustion residuals (CCR), the station previously operated four (4) surface impoundments (Pond 1N, Pond 1S, Pond 2S and Pond 3S). The ponds were used as settling ponds to remove CCR from the stations process water that was sluiced into each pond. Ponds 1N and 1S were taken out of service in 2010 with the CCR remaining in place. In 2013, the water in Ponds 1N and 1S was drained, and both ponds were reconfigured so that they could not accumulate liquids. Pond 3S was taken out of service on April 9, 2021, and Pond 2S was taken out of service on December 10, 2022. On September 9, 2021, the Illinois Pollution Control Board granted Midwest Generation a variance from certain deadlines in the Ill. Adm. Code Title 35, Part 845: Standards for the Disposal of Coal Combustion Residuals in Surface Impoundments (State CCR Rule), including the deadline to submit a construction permit application. *Midwest Generation LLC (Will County Generating Station) v. Illinois EPA*, PCB21-108, Sept. 9, 2021.

The objective of this submittal is to apply for construction permits for Ponds 1N, 1S, 2S, and 3S at the Will County Generating Station to close all four ponds in compliance with the State CCR Rule. The information required for a closure construction permit application for existing surface impoundments as specified under 35 Ill. Adm. Code 845.220 of the State CCR Rule is provided in the following sections.

This permit application is organized with supporting Tables and Figures that are referenced in the discussions being provided at the end of the full Permit text with the table numbers and figures tied to the Section number within which they are referenced with sequential numbering (e.g., Tables referenced in Section 9 are numbered 9-1, 9-2, etc. Figures referenced in Section 9 are numbered Figure 9-1, 9-2, etc.). Specific Attachments referenced within each Section are provided in a similar fashion (e.g., Attachment 1 information is tied to Section 1 of the Permit text, Attachment 2 information is tied to Section 2 of the Permit text, etc.). It should be noted that if a Section does not reference an Attachment, then that Attachment number is not included as part of the permit application. For example, Section 10 does not reference an Attachment; therefore, there is no Attachment 10 in this permit application.

1.0 History of Construction, 845.220(a)(1)

The histories of construction of the CCR surface impoundments as specified in 35 Ill. Adm. Code Section 845.220(a)(1) are presented below.

1.1 CCR Surface Impoundment Identifying Information

The identifying information associated with the CCR surface impoundments at the generating station are listed in the table below.

Name	Owner/Operator	Impoundment ID Number
Pond 1N	Midwest Generation 804 Carnegie Center Princeton, NJ 08540	W19781011-01
Pond 1S	Midwest Generation 804 Carnegie Center Princeton, NJ 08540	W19781011-02
Pond 2S	Midwest Generation 804 Carnegie Center Princeton, NJ 08540	W19781011-03
Pond 3S	Midwest Generation 804 Carnegie Center Princeton, NJ 08540	W19781011-04

1.2 Purpose of CCR Surface Impoundment

1.2.1 Pond 1 North

Pond 1 North (Pond 1N) is inactive and not used as part of the CCR management system. When Pond 1N was active (2010 and prior) it served as a settling pond for sluiced Unit 1 & 2 CCR and other process water associated with the electrical power generating process occurring at site. The CCR remains within the extent of Pond 1N which has been graded with a low point drain to preclude precipitation accumulation.

1.2.2 Pond 1 South

Pond 1 South (Pond 1S) is inactive and not used as part of the CCR management system. When Pond 1S was active (2010 and prior) it served as a settling pond for sluiced Units 1 & 2 CCR and other process water associated with the electrical power generating process occurring at site. The CCR remains within the extent of Pond 1S, which has been graded with a low point drain to preclude precipitation accumulation.

1.2.3 Pond 2 South

Pond 2 South (Pond 2S) is out of service and formerly served as a settling pond for sluiced Units 3 & 4 CCR and other process water associated with the electrical power generating process occurring at site. The CCR impoundment was removed from service on December 10, 2022, with all process water inputs secured. The CCR remains within the extent of Pond 2S and accumulated precipitation is periodically de-watered to the waste water treatment facility using temporary pumps.

1.2.4 Pond 3 South

Pond 3 South (Pond 3S) is out of service and formerly served as a settling pond for sluiced Units 3 & 4 CCR and other process water associated with the electrical power generating process occurring at the site. The CCR impoundment was removed from service on April 9, 2021, with all process water inputs secured. The CCR remains within the extent of Pond 3S and accumulated precipitation is periodically de-watered to the waste water treatment facility using temporary pumps.

1.3 CCR Surface Impoundment Length of Operation

1.3.1 Pond 1 North

Pond 1N was constructed circa 1979 and was removed from service in 2010. The pond was operational for approximately 31 years.

1.3.2 Pond 1 South

Pond 1S was constructed circa 1979 and was removed from service in 2010. The pond was operational for approximately 31 years.

1.3.3 Pond 2 South

Pond 2S was constructed circa 1979 and was removed from service on December 10, 2022. The pond was operational for approximately 43 years.

1.3.4 Pond 3 South

Pond 3S was constructed circa 1979 and was removed from service on April 9, 2021. The pond was operational for approximately 42 years.

1.4 Type of CCR in Surface Impoundment

1.4.1 Pond 1 North

The types of CCR present in Pond 1N are bottom ash and economizer ash. The chemical constituents that make up the ash are explained in further detail in Section 2.

1.4.2 Pond 1 South

The types of CCR present in Pond 1S are bottom ash and economizer ash. The chemical constituents that make up the ash are explained in further detail in Section 2.

1.4.3 Pond 2 South

The types of CCR present in Pond 2S are Unit 4 bottom ash and economizer ash. The chemical constituents that make up the CCR are explained in further detail in Section 2. CCR constituents contained in Pond 2S are similar to the CCR constituents contained in POND 3S because they were both coal combustion by-products from Unit 4.

1.4.4 Pond 3 South

The types of CCR present in Pond 3S are Unit 4 bottom ash and economizer ash. The chemical constituents that make up the CCR are explained in further detail in Section 2. CCR constituents contained in Pond 3S are similar to the CCR constituents contained in POND 2S because they were both coal combustion by-products from Unit 4.

1.5 Name and Size of the Watershed

Ponds 1N, 1S, 2S, and 3S are present within the Des Plaines River watershed, which is approximately 28,808 acres.

1.6 Description of CCR Surface Impoundment Foundation

Ponds 1N, 1S, 2S, and 3S consist of partial fill embankments. The crest of the embankments surrounding Ponds 1N, 1S, 2S, and 3S are elevated compared to the surrounding topography. A divider berm separates Pond 1S from Pond 2S, Pond 2S from Pond 3S. The divider berm acts as a south embankment for Pond 1S and a north embankment for Pond 3S, and north and south embankments for Pond 2S. A constructed plateau divides Pond 1N and Pond 1S where the Ash Sluice Water Recycle Pump House is located. This plateau creates the north embankment for Pond 1S and the south embankment for Pond 1N. The west and north embankments are elevated with gravel access roads on the embankment crest and the east embankment is heavily vegetated.

The following sections discuss the foundation materials' physical and engineering properties. KPRG and Associates, Inc. (KPRG) reviewed the available material associated with Pond 1N, 1S, 2S, and 3S from a 2005 KPRG site visit, along with publicly available information to provide the discussions in the below sections.

1.6.1 Physical Properties of Foundation Materials

The physical properties of the foundation materials in which Ponds 1N, 1S, 2S, and 3S were constructed consist of a fill layer with underlying sandy and gravelly units and some clay. KPRG performed a geotechnical investigation in 2005 that consisted of performing soil borings adjacent to the four existing CCR surface impoundments. The borings performed to the south of Pond 1N, east of Pond 1S, along with north and west of Pond 2S and Pond 3S show that the site stratigraphy consists of a 1.5 feet to 2.5 feet thick fill layer at the site surface that contains some ash/slag with little gravel around Pond 2S and Pond 3S. In general, the fill layer is underlain by a 7.5 to 8.5-feet thick layer of silty sand, silt, and clay. The surface layer north of Pond 2S is underlain by a 1-foot thick layer of sand and silt with some gravel, which is underlain by 5-feet of lean clay. The surface layer west of Pond 3S is underlain by a 3-feet thick layer of sand and gravel with clay and this layer is then underlain by 5-feet of silty clay. Bedrock was generally encountered at approximately 10 feet below ground surface (bgs).

1.6.2 Engineering Properties of Foundation Materials

The engineering properties for the foundation materials listed in the following table are from the site investigation performed by KPRG in 2005. The properties were determined from previous site investigations.

Material	Unit Weight (lbs/ft^3)	Drained friction angle (degrees)	Effective cohesion (lbs/ft^2)
Sand and Gravel	109	30	0
Silty Clay	120	0	1,000
Bedrock	150	35	0

The silty clay is underlain by Silurian Dolomite with an average Rock Quality Designation (RQD) of 94.84%. The RQD from the samples collected with the closest proximity to Pond 1N and Pond 1S is 99.45%. The RQD from the samples collected with the closest proximity to Pong 2S and 3S is 99.45%. The closest proximity samples are approximately 13 to 15 miles from Pond 1N, Pond 1S, Pond 2S, and Pond 3S. These RQDs were obtained from a study performed by the Illinois Geological Survey in 1991 titled “Geotechnical Properties of Selected Pleistocene, Silurian, and Ordovician Deposits of Northeastern Illinois”. An RQD greater than 75% is considered good and an RQD greater than 90% is considered excellent. The RQD is a measure that determines the quality of rock and is used as part of the early site evaluation process when determining locations for engineered structures such as power facilities, underground tunnels, and dams. During the early site evaluation process, the RQD is used to determine any potential problems of bearing capacity, settlement, or sliding. The higher the RQD percentage, the more competent the rock and its ability to support structures, resist settlement and prevent sliding.

1.7 Description of the Construction Materials, Methods, and Dates

The descriptions of the construction materials, methods, and dates are based on the construction drawings created by Harza Engineering Company (Harza) dated 1979; the liner replacement drawings dated 2009 and 2013, for Pond 3S and Pond 2S, respectively; and a 2005 site investigation performed by KPRG.

1.7.1 Physical and Engineering Properties of Construction Materials

The Ponds 1N, 1S, 2S, and 3S physical properties for the construction materials for this section are the same as the physical properties for the foundation materials. As described in Section 1.6.1, the physical properties for the foundation materials were described as sandy fill material with underlying sandy and gravelly units and some clay.

Based on construction documents available from Harza dated 1979, dikes existed in the area prior to construction of Pond 1N, Pond 1S, Pond 2S, and Pond 3S. During construction, these dikes were raised and widened with compacted fill material. The interior slopes of all four ponds were originally lined with fill material and shot rock, which is similar to rip rap, and the pond base was originally lined with three layers consisting of a 12-inch Poz-O-Pac layer, a 12-inch fill layer, and another 12-inch Poz-O-Pac layer on top of the fill layer. The interior slopes and base were then covered with a bituminous curing coat.

In 2013, Pond 2S’s original upper Poz-O-Pac layer and fill material in the pond base were removed and replaced with a 60-mil HDPE geomembrane liner on the base and interior slopes for Pond 2S. The lower layer of Poz-O-Pac remained. Pond 2S also has a concrete geocell on the sides of the basin. In 2009, Pond 3S’s original upper Poz-O-Pac layer and fill material in the pond base were removed and replaced with a 60-mil HDPE geomembrane liner on the base and interior slopes for Pond 3S. The lower layer of Poz-O-Pac remained. A warning layer was constructed in both Ponds 2S and 3S on top of the HDPE geomembrane liner that consisted of 12 inches of sand-sized material overtopped with 6 inches of crushed stone like material.

Engineering properties used for the design and construction of Ponds 1N, 1S, 2S, and 3S were obtained from Station personnel. These properties are provided in the following table. These properties were determined by Civil & Environmental Consultants, Inc. (CEC) using previous site investigation material, published correlations, and their experience with similar materials in the region.

Material	Unit Weight (lbs/ft^3)	Drained friction angle (degrees)	Effective cohesion (lbs/ft^2)	Undrained Shear Strength (lbs/ft^2)
Fill Material	120	0	300	600
Poz-O-Pac	125	32	0	--

1.7.2 Construction Methods

Based on construction documents available from Harza dated 1979, dikes existed in the area prior to construction of the ponds. During construction, these dikes were raised and widened with fill material. The fill material was placed at the desired height and width and compacted to the extent necessary to prevent erosion. As part of placing the fill material, any unsuitable material identified within the existing foundations was specified to be removed based on the construction drawings.

The side slopes were designed with 3H:1V (horizontal:vertical) interior slopes, with 3H:1V exterior slopes when the outer embankment is the interior slope of the adjacent pond. The exterior embankment of the north slope of Pond 1N was designed with an approximate 2H:1V slope, the exterior embankment of the west slope of Pond 1N and Pond 1S is approximately 3H:1V. The north embankment of Pond 1S does not have an exterior slope because the crest of the embankment is at the same elevation as the ground level going north. The exterior embankment of the south slope of Pond 2S was designed with a 2H:1V slope, the exterior embankment of the west slope of Pond 2S and Pond 3S is approximately 3H:1V. The north embankment of Pond 2S does not have an exterior slope because the crest of the embankment is at the same elevation as the ground level going north.

1.7.3 Construction Dates

Pond 1N, Pond 1S, Pond 2S, and Pond 3S were constructed circa 1979. The liner for Pond 2S was replaced in 2013 and the liner for Pond 3S was replaced in 2009.

1.8 Detailed Dimensional Drawings

Construction drawings for Ponds 1N, 1S, 2S, and 3S created by Harza dated 1979 are included in Attachment 1-1. The liner replacement drawings from Pond 2S prepared by NRT, dated 2014, are included in Attachment 1-2, and the liner replacement drawings for Pond 3S prepared by NRT, dated 2010, are included in Attachment 1-3.

1.9 Instrumentation

There is no instrumentation present in Pond 1N and Pond 1S. Pond 1N and Pond 1S are both inactive surface impoundments and the existing CCR has been graded to prevent the occurrence of standing water.

Staff gauges were installed within Pond 2S and Pond 3S to allow for the determination of water levels within each pond. The staff gauge installation met the requirements under 35 Ill. Adm. Code Section 845.650(b)(3) to allow water level estimates to be made concurrent with monthly groundwater level measurements. There is no other instrumentation present in Pond 2S or Pond 3S. Pond 2S and Pond 3S are not in service, so wastewater is not directed to either pond and the water in the ponds is either rainfall or runoff.

1.10 Area-Capacity Curve

An area-capacity curve for Pond 1N is provided on Figure 1-1, an area-capacity curve for Pond 1S is provided on Figure 1-2, an area-capacity curve for Pond 2S is provided on Figure 1-3, and an area-capacity curve for Pond 3S is provided on Figure 1-4.

1.11 Spillway and Diversion Capacities and Calculations

The only spillway and/or diversion features are the existing outlet troughs for Pond 1N, Pond 1S, Pond 2S, and Pond 3S. The original drawing showing the size and shape of the outlet troughs for all four ponds is shown in Attachment 1-1. The outlet troughs consist of rectangular structures that are semi-circular in shape, which matches the shape of the west side of each pond. The water flows over a concrete weir into a trough that is connected to the discharge piping. The outlet structure is gravity drained. The original calculations used for the design of the outlet troughs were not available. The drainage capacity for the outlet troughs and discharge pipes for Pond 1N, Pond 1S, Pond 2S, and Pond 3S have always adequately discharged water from each pond without affecting the functionality of the ponds.

1.12 Surveillance, Maintenance, and Repair Construction Specifications

Written specifications for the original construction of Pond 1N, Pond 1S, Pond 2S, and Pond 3S are not available. The specifications available are from the 2013 liner replacement project from Pond 2S. The specifications for Pond 2S are included in Attachment 1-4. Written specifications for the liner replacement of Pond 3S are unavailable.

1.13 Record of Structural Instability

There is no record or knowledge of structural instability associated with Pond 1N, Pond 1S, Pond 2S, and Pond 3S. Pond 1N, Pond 1S, Pond 2S, and Pond 3S were inspected by CEC in September 2022. The results of their inspection did not identify signs of structural instability.

2.0 Narrative Description of the Facility, 845.220(a)(2)

2.1 CCR Type and CCR Chemical Analysis

The CCR present in Pond 1N, Pond 1S, Pond 2S, and Pond 3S are bottom ash and economizer ash. The CCR that was sluiced to Pond 2S was sampled and analyzed for the parameters listed in 35 Ill. Adm. Code Section 845.600(a) except for total dissolved solids. The results of those analyses are presented in Table 2. The laboratory data package is included in Attachment 2. The CCR present in Pond 1N, Pond 1S, and Pond 3S is the same as the CCR present in Pond 2S, and therefore the sample from Pond 2S is also representative of the CCR in Pond 1N, Pond 1S, and Pond 3S.

2.2 Maximum Capacity

The estimate of the maximum capacity of Pond 1N is 22,680 cubic yards (CY). The estimate of the maximum capacity of Pond 1S is 20,380 CY. The estimate of the maximum capacity of Pond 2S is 21,300 CY. The estimate of the maximum capacity of Pond 3S is 24,400 CY.

2.3 Waste Streams

Pond 1N and Pond 1S are inactive and do not receive any waste streams. These ponds were taken out of service in 2010. Pond 2S and 3S are out of service and formerly received both CCR and non-CCR waste streams before being taken out of service in 2022 and 2021, respectively. The following non-CCR waste streams were received by Ponds 2S and 3S:

- Overflow from the Stations South Area Runoff Basin;
- Overflow from the Unit 4 boiler slag tanks;
- Sludge recycles from the Station’s two clarifiers

The chemical constituents from the non-CCR wastestreams listed above were anticipated to be total suspended solids (TSS) and oil and grease as based on the sampling requirements in the stations NPDES Permit No. IL0002208.

2.4 On-Site Transportation Plan

The Will County Generating Station property is a secure facility. The property boundary is fenced with one main gate that is guarded 8 hours a day, Monday thru Friday with periodic roving security patrols on afternoon shifts, midnight shifts, and weekend shifts. Access to the plant is controlled through the main gate with visitors required to sign in and out with the guard personnel. Other gates are present at the facility, but they remain locked at all times with access only provided by Midwest Generation personnel.

Upon approval of this permit, closure construction will commence on Pond 1N, Pond 1S, Pond 2S, and Pond 3S. All four ponds will be closed with the CCR remaining in place and the construction of a final cover system. During the closure activities that main gate access road, mentioned above, will be used to control access to the property.

The ponds will be accessed using the existing roads on the property. There is one main road that leads from the main access gate located in the northwest corner of the property to the ponds that are located on the southwest side of the property, which is shown on Figure 2. The ponds are accessible by a gravel road that runs along the west side of the ponds and has entrances to the north and south of the ponds. The land to the east of the ponds is accessible, but it is not a constructed road. These roads are shown on Figure 2. The roads shown on Figure 2 will be used to access the ponds by construction personnel to bring materials and equipment that will be used to execute the closure process, which includes off-site fill material and the components of the final cover system. The normal day to day operations of the ponds does not require access. Midwest Generation personnel use the access roads to perform inspections as needed to ensure that no issues arise. On a quarterly basis, groundwater sampling will be performed at the monitoring wells that surround the ponds and these roads will be used to access the wells. Each sampling event requires 2 to 3 days to perform.

As needed, intersections at the property are traffic controlled with stop signs and the speed limit on the property is 5 miles per hour. The large construction equipment will have either backup alarms or spotters as they are backing up when near the edge of the ponds.

3.0 Site Location Map, 845.220(a)(3)

A site location map on the most recent United States Geological Survey (USGS) quadrangle of the area from the 7 ½ minute topographic series has been included in Attachment/Figure 3. This map includes details regarding the facility and adjacent properties boundaries extending 1000 meters, surface waters, the prevailing wind direction, and the limits of all 100-year floodplains. Alongside this, all natural areas designated as a Dedicated Illinois Nature Preserve under the Natural Areas Preservation Act, all historic and archaeological sites designated by the National Historic Preservation Act and the Illinois Historic Sites Advisory Council Act, and all areas identified as critical habitat under the Endangered Species Protection Act of 1973 and the Illinois Endangered Species Protection Act are also shown on this map.

4.0 Site Plan Map, 845.220(a)(4)

Site plan map(s) in accordance with 845.220(a)(1)(4) are included in Attachment 4. The information required is depicted on multiple maps. Figure 4-1 shows the entire Will County Station including the existing groundwater monitoring wells, the existing CCR surface impoundments, and the main service corridors, transportation routes, and access roads. Cross-sectional maps showing the boundaries above and below ground level of the facility and CCR surface impoundments are included in Figures 4-2 through 4-5.

5.0 Construction Description, 845.220(a)(5)

The closure of Ponds 1N, 1S, 2S, and 3S will be accomplished by leaving the CCR in place and covering it with a final cover system in accordance with 845.750. The closure will achieve the closure performance standards in accordance with 845.720(a). As required, a final cover system (FCS) will be installed over the CCR in accordance with 845.750(c). The closure will be implemented in accordance with the Drawings and Specifications included in Attachment 5. In general, the execution of closure will include the following methods and procedures:

1. Obtaining a construction permit from the Illinois EPA for closing the ponds;
2. Drawing down the free surface water in the pond by evaporation and by draining water into the concrete overflow trough at the west end of each pond
3. Once the water elevation is below the weir elevation, promoting additional drainage and dewatering by:
    a. Excavating sumps and trenches within the CCR material,
    b. Using portable pumps as necessary to remove additional water by pumping water over the weir into each pond's concrete overflow trough, and/or
    c. Utilizing earthmoving equipment to move the ash within each pond
4. The vegetation present in Pond 1N and Pond 1S will be removed as necessary to allow for CCR regrading;
5. The CCR in each pond will be regraded to establish the slopes necessary for the placement of the FCS. The CCR will be compacted to stabilize it prior to placement of the FCS and to reduce the potential for future settling.
6. Placing and grading structural fill material within a pond if enough CCR is not available in the pond to establish the slopes for the FCS;
7. Installing the low permeability layer of the FCS;
8. Installing the final protective layer over the low permeability layer;
9. Seeding the final protective layer; and
10. Initiating post-closure monitoring of groundwater, and final cover system integrity

5.1 Obtain EPA Construction Permit

This submittal is the application for an IEPA construction permit to close Pond 1N, Pond 1S, Pond 2S, and Pond 3S by leaving the CCR in place and covering with a final cover system.

5.2 Dewatering

Pond 2S and Pond 3S will be dewatered to an extent to allow the grading of CCR. Any water from Pond 1N and Pond 1S will also be removed through dewatering. The water will initially be removed by draining into the concrete overflow trough by gravity. The remaining water will be removed through artificially pumping from the pond into concrete overflow trough. The water pumped from the ponds will be discharged into the overflow troughs, which drain into the Recycle Pump Station. The water is then pumped and discharged through the NPDES regulated outfall located at the northeast corner of the property.

5.3 Site Clearing and Grubbing

Vegetation will be removed from the site to execute the closure. Trees and grass from Pond 1N and Pond 1S and other areas around the ponds, as needed, will be removed and disposed of either onsite or offsite. As needed, some areas around the ponds may be graded and shaped to create a staging area for the contractor.

5.4 Grading of CCR and Placement of Fill Material

The CCR remaining in Ponds 1N, 1S, 2S, and 3S will be graded with the intention to direct non-contact stormwater runoff to each pond’s concrete overflow trough along its west side. Additional fill material will be placed in a pond to establish the grades for stormwater management if sufficient quantities of CCR are not present in the pond for this purpose at the time of closure. The graded CCR/fill material will form the foundation layer for each pond’s FCS and the slopes will be steep enough to prevent stormwater from ponding on the cap, but not so steep as to cause erosion. The grading will also be designed to accommodate potential settling and subsidence while maintaining positive drainage. As the slopes are constructed, measures will be taken to prevent sloughing and movement of the material and final cover system during the post-closure period. The layer of CCR/fill material directly below the geomembrane will be free from large, protruding, or sharp objects that could potentially damage the geomembrane.

5.5 Installation of Final Cover System

The FCS that will be installed over the regraded and compacted CCR is the engineered final cover system ClosureTurf created by Watershed Geo, LLC. ClosureTurf consists of a geomembrane low permeability layer that also incorporates a drainage layer. The final protective layer consists of engineered synthetic turf that is infilled with sand/small aggregate to provide ballast to the synthetic turf. The infiltration layer will be a 60-mil HDPE geomembrane with a hydraulic conductivity that is no greater than $1x10^{-7}$ centimeters per second (cm/sec). The engineered synthetic turf is comprised of polyethylene fibers that are tufted through a double layer of woven geotextiles that are highly UV and heat resistant. The engineered synthetic turf is then infilled with small aggregate that is approximately 1/8 inch to 1/4 inch diameter in size. The small aggregate is brushed into the synthetic turf to ensure that it settles to the bottom of the turf, which provides ballast and prevents the turf’s movement during wind events.

35 Ill. Adm. Code Section 845.750(c)(1) requires that the low permeability layer must have a permeability less than or equal to the permeability of any bottom liner system present or a hydraulic conductivity no greater than 1×10^{-7} cm/sec. Ponds 1N and 1S have the original Poz-O-Pac liner on the floors and sides of the ponds. The hydraulic conductivity of the original Poz-O-Pac liner is approximately 1×10^{-5} cm/sec; therefore, the low permeability layer’s permeability for the final cover system must be no greater than 1×10^{-7} cm/sec. As such, the low permeability layer in the ClosureTurf final cover system will be a 60-mil HDPE textured geomembrane that combines a studded drain surface on the top side and a spiked friction surface on the bottom side into one geomembrane liner. This 60-mil HDPE geomembrane has a permeability that has been independently tested at 1.5×10^{-13} cm/sec.

Ponds 2S and 3S both have a 60-mil HDPE geomembrane liner on the floors and sides of the ponds; therefore, the low permeability layer in each pond’s FCS must have a permeability that is equal to or less than the effective permeability of the existing liner.

When using a geomembrane as the low permeability layer, it is required by 35 Ill. Adm. Code 845.750(c)(1)(B)(i) to have a hydraulic flux equivalent or superior to a 3-foot layer of soil with a hydraulic conductivity of 1×10^{-7} cm/sec. The following table demonstrates that the geomembrane provides a superior performance at reducing the infiltration of liquid when compared to a 3-foot thick layer of earthen material. The following table is created here to demonstrate the geomembrane that will be used as part of the ClosureTurf final cover system is compliant with 35 Ill. Adm. Code 845.750(c)(1)(B)(i). Note that this demonstration assumes 5.96 inches (0.15 meter) of hydraulic head is present on the geomembrane, which is the estimated 25-year, 24-hour precipitation depth at the station.[1] This is a conservative assumption because the final cover system will be sloped to preclude the accumulation of storm water on the geomembrane.

Liquid Flow Rate Comparison Between Low Permeability Layers Constructed Using Geomembrane & Earthen Material

Parameter	Symbol	Value
Liquid Flow Rate Through Earthen Material		
Hydraulic Conductivity	k	1×10^{-9} m/sec
Hydraulic Head Above Layer	h	0.15 m
Layer Thickness	t	3 ft = 0.91 m
Hydraulic Gradient Through Earthen Material	$i = h / t$	0.16
Liquid Flow Rate Through Layer per Acre of Final Cover System	$q = k \times (i + 1)$	1.16×10^{-9} $m^3/sec/m^2$
Liquid Flow Rate Through Geomembrane		
Hole Area in Geomembrane	a	3.1 mm^2 / 4000 m^2
Acceleration Due to Gravity	g	9.81 m/sec^2
Hydraulic Head Above Layer	h	0.15 m
Liquid Flow Rate Through Layer per Unit Area	$q = 0.6a(2gh)^{0.5}$	7.98×10^{-10} $m^3/sec/m^2$

The geomembrane comes in rolls, which will be deployed with the spike side down and the stud side up on top of the graded CCR/fill material. The rolls will be deployed perpendicular to the slope elevation contours and the deployment method will protect the geomembrane as well as the graded CCR/fill material. Adequate anchoring will be used, such as sand bags, to prevent uplift by wind during the deployment of the geomembrane rolls. The edges of each roll are overlapped in the downgrade direction a minimum of three inches to form the seam that is then welded together. Welding is performed by either extrusion welding or hot wedge welding depending on manufacturer's recommendations and as construction of the geomembrane dictates.

The geomembrane will be covered with engineered synthetic turf and sand/aggregate infill which will be the final protective layer. The engineered synthetic turf is green and replaces the need for an erosion layer and vegetation while providing a natural look and feel of grass and protecting the geomembrane from extreme weather. The engineered turf does not require as much maintenance as a vegetated final protective layer which needs to be mowed regularly and may need to be reseeded, refertilized, and/or regraded throughout the post-closure period. The engineered turf will

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[1] Will County Stormwater Technical Guidance Manual (August 25, 2010).

be installed in accordance with the manufacturer's recommendations and equipment used during the installation will not damage the turf or the underlying geomembrane.

The engineered synthetic turf also comes in rolls, which will be rolled out on top of the geomembrane starting from the highest slope to the lowest slope. The rolls will be deployed so that the filaments of the engineered turf are pointed upslope and the edges of each roll touch each other so the seams can be joined together. The turf will be laid substantially smooth and it will be secured with sandbags at the top of any slope after it is deployed. The engineered synthetic turf will cover all of the geomembrane and will follow the same slope as the geomembrane. The rolls of the engineered turf are joined together either by sewing with polyester thread or by fusion seaming with a fusion welder.

It's important to note that a thicker final protective layer is not needed for frost protection because the freeze-thaw cycle and freezing temperatures does not affect the hydraulic performance of the geomembrane liner that will be used as the final protective layer based on the Geosynthetic Institute's White Paper #28, titled "Cold Temperatures and Free[ze]-Thaw Cycling Behavior of Geomembranes and Their Seams."

A specified sand/aggregate infill will be placed between the blades of the engineered synthetic turf after the turf is in place on top of the geomembrane. The sand infill will be spread with a minimum thickness of 0.5 inches and a maximum thickness of 0.75 inches using conveyor systems and/or express blowers. The infill will be driven into the space between the synthetic blades and the sand/aggregate mixture will meet ASTM C-33-03 for fine aggregates. The infill thickness will be checked at approximately 100-foot grid intervals. The sand infill installation will be done as to not damage or displace previously installed ClosureTurf components and the placement will not occur with snow or ice on the engineered turf.

Run-outs and batten bars will be used to secure the ClosureTurf system. Run-outs will be used when the ClosureTurf system is extended over the adjacent access roads along the perimeters of the ponds and on the berms in between Ponds 1S and 2S and Ponds 2S and 3S. Along the east side of Pond 1S and the southeast portion of Pond 1N, the ClosureTurf system will be secured by connecting it to the existing concrete walls using batten bars. The proposed methods to secure the ClosureTurf system are shown on Drawing Number WC-APC-CSK-007 in Attachment 5.

QA/QC testing will be performed on the ClosureTurf cover system as part of the installation in accordance with Specification W-9101 located in Attachment 5.

6.0 Facility Component Plans and Specifications, 845.220(a)(6)

The Will County Station has generating units that previously burned coal to generate electricity; the station ceased operations on June 10, 2022. The station previously burned coal in the boilers and the CCR byproducts resulting from burning coal were fly ash and bottom ash. The majority of the fly ash was captured before it escaped the boiler exhaust stacks and the bottom ash dropped to the bottom of each boiler. The fly ash was collected and sent to on-site storage silos using air pressure. The bottom ash was removed from the boilers and sluiced to Ponds 1N, 1S, 2S, and 3S for temporary storage. Ponds 1N and 1S were taken out of service when Units 1 and 2 were retired in 2010, Pond 3S was taken out of service on April 9, 2021, and Pond 2S was taken out of service with the ceasing of operations on June 10, 2022. With the ceasing of operations, the ponds are no longer used for temporary storage of CCR.

Attachment 6 contains the drawings that show the extent of the Will County station and sections/details for the construction of the ponds. The generating station is located on the east side of the property near the CSSC and the ponds are located on the west side of the property. Reviewing these documents shows that the piping that sluices CCR to the ponds emanate from the south side of the generating building, where they run approximately 920 feet west to the ponds, at which point, the pipes turn 45 degrees and run for approximately 250 feet where they enter a distribution structure. From this structure, multiple pipes travel above ground to each pond to allow for the sluice water to be distributed to the ponds depending on which pond was in operation at the time. The sluice water would enter each pond through each pond's respective inlet pipes on the east side of each pond that came from the distribution structure. Once the sluice water enters each pond it disperses into the pond and allows the CCR to settle and remain in the pond. Each pond is constructed with a concrete overflow trough on west side. Water spills over a weir is collected in the overflow trough, which has a discharge pipe that ultimately drains the water to the Recycle Wet Well. From the Recycle Wet Well the water was recycled (pumped) back to the station for reuse in the bottom ash sluice system. A portion of this recycle water was periodically transferred to the waste water treatment system for treatment prior to discharge at the NPDES regulated outfall

7.0 Closure Construction, 845.220(d)

7.1 Closure Prioritization Category

In accordance with the requirements of 35 Ill. Adm. Code Section 845.700(c), the category designation for Ponds 1N and 1S are Category 6. The category designation for Ponds 2S and 3S are Category 7. The category designations were previously provided as part of the initial Operating Permits for Ponds 1N/1S and Ponds 2S/3S.

7.2 Final Closure Plan

Ponds 1N, 1S, 2S, and 3S will be closed with the CCR remaining in place and topped with a final cover system. The final cover system will consist of an alternate final cover system in accordance with 845.750. The alternate final cover system will be the proprietary ClosureTurf, which is a multi-component final cover system design by Watershed Geo that consists of a textured geomembrane, a synthetic turf, and a ballast Infill. The Final Written Closure Plan is written in accordance with 35 Ill. Adm. Code Section 845.720(a) and provided in Attachment 7-1.

7.3 Closure Alternatives Analysis

A closure alternatives analysis (CAA) was completed for Ponds 1N, 1S, 2S, and 3S. The CAA evaluated closing the ponds by complete removal of CCR in accordance with Sections 845.710(c) and 845.740, leaving the CCR in place in each pond and installing a final cover system, leaving

CCR in place and performing in-situ soil stabilization, and consolidating the CCR and installing a final cover system. The completed CAA is included in Attachment 7-2.

7.4 Proposed Closure Schedule

Closure activities are anticipated to be performed concurrently for all four ponds and are estimated to be completed in less than three years from start to finish, including an allowance for permitting time. The following table lists the major milestones necessary for closing Ponds 1N, 1S, 2S, and 3S and the expected duration to complete each milestone.

Planning Level Schedule for Closing the Ponds

Activity	Estimated Duration
Prepare Closure Construction Design Documents	7 Months
Obtain Closure Construction Permit from Illinois EPA	11 Months
Hire Contractor to Complete Closure Activities in Accordance with Illinois EPA Permit	4 Months
Draw Down Water & Dewater Impounded Ash	4 Months
Grade Dewatered Ash, Place and Grade Structured Fill	1 Months
Install Final Cover System	2 Months
Submit Closure Report and Certification to Illinois EPA	2 Weeks
Obtain Approval of Closure Report and Certification from Illinois EPA	3 Months
Complete and Certify Closure of the Ponds	--

7.5 Post-Closure Plan

As stated earlier in this section, Ponds 1N, 1S, 2S, and 3S will be closed with CCR remaining in place with a final cover system. Post closure care will occur in accordance with 35 Ill. Adm. Code Section 845.780, which includes routine inspections of the final cover system and groundwater monitoring. The Ponds 1N, 1S, 2S, and 3S Final Written Post-Closure Plan has been prepared in accordance with 35 Ill. Adm. Code Section 845.780(d) and is included in Attachment 7-3.

8.0 Groundwater Modeling, 845.220(d)(3)

The groundwater modeling of the CCR surface impoundment as specified in 35 Ill. Adm. Code Section 845.220(d)(3) is presented below.

8.1 Modeling Inputs and Parameters

As discussed in the Illinois CCR Compliance Ash Ponds 1 North and 1 South Annual Groundwater Monitoring and Corrective Action Report, and in the Illinois CCR Compliance Ash Ponds 2 South and 3 South Annual Groundwater Monitoring and Corrective Action Report, both dated January 30, 2023, arsenic, calcium, chloride, molybdenum, and sulfate were detected at concentrations above proposed Groundwater Protection Standards during the 4th quarter 2022 sampling in downgradient monitoring wells. These parameters were the focus of predictive modeling for the selected closure method. It is noted that boron was also added to the above list of parameters to be evaluated since it is a main indicator of potential CCR impacts.

The groundwater flow modeling that was conducted is based on a hypothetical distribution of dissolved contaminants beneath the four ponds, assuming a source at the ponds, to evaluate the selected closure method. To conduct the support modeling a hypothetical unit source with a concentration of “1” was established beneath the ponds and projected forward in time with advection and dispersion to establish an equilibrated distribution of contaminants in groundwater if the ponds were the source. The equilibrated distribution (base case) of the mass was then used as the initial concentrations in the groundwater for model runs to simulate the closure method to evaluate corresponding improvement in groundwater quality from the base case scenario.

The groundwater modeling inputs and parameters are discussed further in the groundwater modeling report in Attachment 8.

8.2 Groundwater Modeling Results

The selected closure method of closure in place with a FCS was modeled involving Ponds 1N, 1S, 2S, and 3S. From the initial equilibrated model run (see Figure 16 in groundwater modeling report in Attachment 8), the hypothetical dissolved contaminants remained in the groundwater beneath the ponds and infiltration was simulated at a reduced rate of 1×10^{-15} meters per second (m/s), which represents the engineered FCS placed over the four ponds. The change in concentrations was modeled over 5-years, 25-years, 50-years, and 100-years and these model runs are shown on Figures 19 and 20 located in the modeling report in Attachment 8. As shown on Figure 19, within 5 years relative concentrations in the groundwater are reduced to less than 0.7 downgradient of Pond 1N and less than 0.9 downgradient of Pond 1S. Figure 19 also shows relative concentrations have decreased by a change of about 10 percent to less than 0.4 downgradient of Ponds 2S and 3S. Within 25 years relative concentrations have reduced below 0.3 downgradient of Ponds 1N, 2S, and 3S, and below relative concentrations of approximately 0.8 downgradient of Pond 1S as shown on Figure 19. Figure 20 shows relative concentrations are mostly stable after 25 years with little change at years 50 and 100 with relative concentrations mostly at 0.4 or less downgradient of the ponds.

The following section is from the Will County Groundwater Modeling Report created by BAS Groundwater Consulting, Inc. This section discusses how the above performed groundwater modeling and the selected closure method was applied to specific constituents detected in downgradient monitoring wells. In the groundwater modelling report, the selected closure method is referenced as Closure Alternative 2. The figures referenced in this section are located in the groundwater modelling report in Attachment 8. The effective reductions in the theoretical mass concentrations discussed in the previous paragraphs for the selected closure method were related to the concentrations of several CCR constituents being monitored in groundwater that were detected at concentrations above their proposed Groundwater Protection Standards (GWPSs) during the 4th quarter 2022 groundwater monitoring event. Specifically, these were arsenic, boron, calcium, chloride, molybdenum, and sulfate. The concentrations of these constituents from the 4th quarter 2022 monitoring in downgradient monitoring wells were used as the starting concentrations for this evaluation. The percent decrease in the surrogate concentrations were calculated from the starting concentrations through the 100-year simulation for the selected closure method, at nine, downgradient CCR monitoring well locations MW-07 through MW-15.

The relative reduction of the surrogate concentration over time can be related to the dissolved mass of any constituent by applying the percent decrease of the surrogate concentration to an initial concentration of a specific constituent of concern. As noted above, an initial concentration was assigned at each of these nine monitoring well locations for specific constituents of concern based on the 4th quarter 2022 sampling event. The calculated percent decrease in the surrogate concentration over the 100-year model simulations was applied to the assigned initial concentration in each monitoring well. For example, the initial concentration (4th quarter 2022 sampling data) for arsenic in monitoring well MW-07 is 0.0032 milligrams per Liter (mg/L). The initial, relative surrogate concentration in monitoring well MW-07 is 0.75 (relative to the source concentration of “1”). The decrease in the surrogate concentration throughout the 100-year closure scenario was calculated as a percentage of the initial, relative concentration in this monitoring well, and the percentage decrease was applied to the initial concentration of 0.0032 mg/L to yield a curve of decreasing arsenic concentrations for the model scenario. The resulting concentrations for each constituent of concern in each monitoring well was compared to the proposed 35 Ill. Adm. Code Section 845.600(a) GWPSs for each constituent. The GWPSs are presented as dashed lines on each monitoring well’s decay curve graph for each modeled alternative.

The decay curves for arsenic concentrations are shown on Figures 27, 28, and 29 for monitoring wells downgradient of Ash Ponds 1N, 1S, 2S, and 3S, respectively. The current concentrations of arsenic are below the proposed GWPSs for Ash Ponds 1N, 1S, 2S, and 3S in all downgradient monitoring wells except MW-10 and MW-11. Therefore, all of the arsenic decay curves start below the dashed line representing the arsenic proposed GWPSs on Figures 27 through 29, except in monitoring wells MW-10 and MW-11. Arsenic concentrations decrease over time in Closure Alternative 2 (the selected closure method), including in monitoring wells MW-10 and MW-11 (Figure 29). Arsenic concentrations decrease below the proposed GWPS in monitoring wells MW-10 and MW-11 within approximately 15 years.

The decay curves for boron concentrations are shown on Figures 30, 31, and 32 for monitoring wells downgradient of Ash Ponds 1N, 1S, 2S, and 3S, respectively for Closure Alternatives 2 (the selected closure method). The current concentrations of boron are below the proposed GWPSs for Ash Ponds 1N, 1S, 2S, and 3S in all downgradient monitoring wells therefore, all of the boron decay curves start below the dashed line representing the boron GWPSs on Figures 30 through 32. Boron concentrations decrease over time in Closure Alternatives 2, which is the selected closure method.

The decay curves for calcium concentrations are shown on Figures 33, 34, and 35 for monitoring wells downgradient of Ash Ponds 1N, 1S, 2S, and 3S, respectively for Closure Alternative 2, which is the selected closure method. The current concentrations of calcium are below the GWPSs for Ash Ponds 1N, 1S, 2S, and 3S in all downgradient monitoring wells except MW-15, therefore, all of the calcium decay curves start below the dashed line representing the calcium GWPSs on Figures 33 through 35 except for monitoring well MW-15. Calcium concentrations decrease over time for Closure Alternative 2 (the selected closure method) at all well locations. At well MW-15, the calcium concentration is reduced to below the proposed GWPS of 109.5 mg/L within approximately 5 years (Figure 33).

The decay curves for chloride concentrations are shown on Figures 36, 37, and 38 for monitoring wells downgradient of Ash Ponds 1N, 1S, 2S, and 3S, respectively for Closure Alternative 2, which is the selected closure method. The current concentrations of chloride are below the proposed GWPSs for Ash Ponds 1N, 1S, 2S, and 3S in all downgradient monitoring wells except MW-09 in which the chloride concentration is equal to the proposed GWPS of 200 mg/L. Therefore, all of the chloride decay curves start below the dashed line representing the chloride GWPSs on Figures 36 through 38 except for monitoring well MW-09. Chloride concentrations decrease over time in Closure Alternative 2, which is the selected closure method. Chloride concentrations decrease below the proposed GWPS of 200 mg/L in monitoring well MW-09 within approximately 1 to 1.5 years (Figure 37).

The decay curves for molybdenum concentrations are shown on Figures 39, 40, and 41 for monitoring wells downgradient of Ash Ponds 1N, 1S, 2S, and 3S, respectively for Closure Alternative 2, which is the selected closure method. The current concentrations of molybdenum are below the proposed GWPSs for Ash Ponds 1N, 1S, 2S, and 3S in all downgradient monitoring wells except MW-08 in which the molybdenum concentration is slightly higher (0.11 mg/L) than the proposed GWPS of 0.1 mg/L. Therefore, all of the molybdenum decay curves start below the dashed line representing the molybdenum GWPSs on Figures 39 through 41 except for monitoring well MW-08. Molybdenum concentrations decrease over time in Closure Alternative 2 (the selected closure method). Molybdenum concentrations decrease below the proposed GWPS of 0.1 mg/L in monitoring well MW-08 in Closure Alternative 2 within approximately 5 years (Figure 40).

The decay curves for sulfate concentrations are shown on Figures 42, 43, and 44 for monitoring wells downgradient of Ash Ponds 1N, 1S, 2S, and 3S, respectively for Closure Alternative 2. The current concentrations of sulfate are below the GWPSs for Ash Ponds 1N, 1S, 2S, and 3S in all downgradient monitoring wells except MW-14 in which the sulfate concentration is higher (570 mg/L) than the proposed GWPS of 547.6 mg/L. Therefore, all of the sulfate decay curves start below the dashed line representing the sulfate GWPSs on Figures 42 through 44 except for monitoring well MW-14. Sulfate concentrations decrease over time in Closure Alternative 2, which is the selected closure method. Sulfate concentrations decrease below the proposed GWPS of 547.6 mg/L in monitoring well MW-14 within approximately 1.5 years (Figure 42).

8.3 Capture Zone Modeling

Capture zone modeling is not applicable based on the selected method of closure.

8.4 Groundwater Modeling Software

The groundwater modeling was completed using standard publically available platforms, which included MODFLOW-NWT and for contaminant transport MT3D-USGS. The graphical user interface is Groundwater Vistas. Both MODFLOW-NWT and MT3D-USGS are publically available programs that can be downloaded from the USGS website at https://water.usgs.gov/water-resources/software/modflow-nwt/ and https://www.usgs.gov/software/mt3d-usgs-groundwater-solute-transport-simulator-modflow, respectively.

9.0 Groundwater Monitoring Program, 845.220(a)(7)

The groundwater monitoring program of the CCR surface impoundment as specified in 35 Ill. Adm. Code Section 845.220(a)(7) is presented below.

9.1 Hydrogeologic Site Characterization

The following subsections provide information on the geology and hydrogeology of the site as required under 35 Ill. Adm. Code Section 845.620(b). Site geology and hydrogeology are discussed separately below.

9.1.1 Geology

The physiography of Will County is made up of ground moraines, end moraines, outwash plains, stream terraces, flood plains and bogs. It is in the Till Plaines and Great Lakes Sections of the Central Lowland Province. Near surface soils in the vicinity of the subject impoundment are predominately Romeo Silt Loam and Joliet Silt Loam, both with areas that are frequently flooded. These soils are poorly drained. Organic content ranges from 3 to 5 percent and have a low to negligible accelerated erosion rate, a low to high corrosivity rate and a pH range from slightly acidic to slightly basic (6.1 to 8.4). Surface runoff class is low (Soil Survey of Will County Illinois). Based on the Surficial Geology Map of Romeo Quadrangle (Caron, 2017) the surficial deposits in the vicinity of the subject surface impoundments are identified as disturbed ground which is generally described as diamicton, sand, gravel, silt and peat as much as 40 feet thick. This disturbed ground is generally interpreted as disturbed land, which includes former gravel pits and major areas of construction.

The general stratigraphy in the area consists of post-glacial alluvium underlain by unconsolidated glacial deposits, which overlay Silurian dolomite. The Silurian dolomite is underlain by the Maquoketa Group, which includes the Scales Shale, which is considered a regional aquitard separating the overlying Silurian dolomite from the deeper Cambro-Ordovician sandstone and limestone aquifers. To evaluate local stratigraphy, water well logs and engineering test boring logs were obtained for water wells and engineering test borings in the vicinity of the Will County Generation Station. The depths of these wells and borings range from 50 feet to 300 feet. The stratigraphy data from these boring logs and the well locations are provided in Attachment 9-1. In addition, site specific stratigraphy information was obtained from 15 monitoring well borings that were installed in the vicinity of the subject surface impoundments (MW-1 through MW-15; see

Figure 9-1). Boring logs for these monitoring wells are included in Attachment 9-2. Based on an evaluation of the monitoring well boring logs, the following general site-specific stratigraphy is defined and geologic cross-sections developed (Figures 9-2 through 9-5):

- Fill (approx. 5’ to 10’ thick) – Consisting of a thin layer of sand and gravel roadway followed by brown and black silty clay and silty sand mixed with gravel and crushed dolomite. The fill may include coal, black cinders and slag.

- Silty Sand, Silt and Clay (approx. 1’ – 16’ thick) – Consisting of gravelly tan to brown silty sand fining downward to gray/greenish mottled silty clays and clay.

- Bedrock – Dolomite bedrock. Top of weathered bedrock is generally encountered between 9 feet and greater than 20 feet below ground surface with depth increasing towards the southwest. It is noted that at monitoring well location MW-12, top of bedrock was not encountered at the terminus of the boring at 20 feet below ground surface.

The Silurian dolomite is divided into four units identified as a weathered bedrock rind, Joliet Formation dolomite, Kankakee Formation dolomite and the Elwood/Wilhelmi dolomite. Beneath the Silurian dolomite is the Ordovician age Maquoketa Group consisting of the Brainard Shale, Fort Atkinson dolomite and the Scales Shale. The Brainard Shale unit is not necessarily regionally continuous, therefore it may or may not be present beneath the subject site. The Scales Shale unit, however, is extensive and is a recognized regional aquitard, which hydraulically isolates the deeper bedrock aquifers from the shallower Silurian dolomite. Based on the available information, the dolomite bedrock thickness to the top of the Scales Shale beneath the Will County site is approximately 55 feet.

Regional and local studies and investigations document fractures in the Silurian dolomite describing a primary joint set that is vertical and oriented about N52ºE and N40ºW. The N40ºW joints are described as “more distinct”. Natural spacing between the joint sets ranges from 3 to more than 10 feet, and joint apertures are described as less than 1/16th -inch. Bedding plane fractures are also described. Descriptions from various bedrock quarry walls show significant clay infilling of the vertical joints and bedding plane fractures. Evidence of water movement through fractures is interpreted from iron staining and mineralization (primarily calcite, with some pyrite and marcasite).

Silurian dolomite is a calcium-magnesium carbonate rock that includes horizons of cherty (silica) nodules and is documented both regionally and locally to include mineralization along fractures and within vugs. The mineralization includes, but is not limited to calcite (calcium carbonate) and various sulfide minerals such as pyrite, marcasite, etc. As such, the presence of these minerals and associated weathering products can also be expected within the overlying unconsolidated materials.

There are no underground mines beneath the subject CCR surface impoundment.

9.1.2 Hydrogeology

Based on information from the Soil Survey of Will County, the average annual precipitation is approximately 37 inches with about 63% of that total falling between April and October of any given year. The average seasonal snowfall is approximately just over 10 inches. More site-specific precipitation data from water stations located in Will County is provided in Table 9-1.

The nearest surface water bodies are the Des Plaines River and the Chicago Ship and Sanitary Canal (CSSC) respectively located to the west and east of the subject CCR units (see Figure 9-1). There are no drinking water intakes within the segment of river adjacent to the subject site and for that matter on any portion of the Des Plaines River downstream of the site (Meet Your Water – An Introduction to Understanding Drinking Water in Northeastern Illinois, Metropolitan Planning Council, 2017).

Groundwater beneath the subject units occurs under water table conditions. Saturated conditions are generally encountered between 8 and 12 feet bgs, depending on the well location, within the lower portion of the above defined silty sand/silt/clay unit and/or bedrock. Table 9-2 provides groundwater elevation measurements through 2nd quarter 2023 obtained for the 15 on-site monitoring wells in the vicinity of the subject CCR surface impoundments, which includes data for the monitoring wells associated specifically with these impoundments (Pond 1N upgradient wells MW-1 and MW-2 and downgradient wells MW-7, MW-14 and MW-15; Pond 1S upgradient wells MW-3 and MW-4 and downgradient wells MW-8, MW-9 and MW-13; Ponds 2S and 3S upgradient wells MW-5 and MW-6 and downgradient wells MW-9, MW-10, MW-11, and MW-12). A hydrograph of water levels for the monitoring wells associated with Ponds 1N, 1S, 2S, and 3S is provided as Figure 9-6. A review of the hydrograph shows some slight temporal fluctuations with the highest water levels tending to be in the May timeframe and the lowest water levels generally occurring August through October timeframe.

Groundwater flow maps for the five rounds of groundwater elevations collected between April 2021 and November 2021 are provided as Figures 9-7 through 9-11. The maps include groundwater elevation data from all 15 wells in the area, including the specific CCR monitoring wells associated with the subject surface impoundments. Based on a review of the maps groundwater flow is in a westerly direction. These maps are consistent with historical flow data for the site. The horizontal hydraulic gradient is fairly shallow. Table 9-3 provides a summary of the flow direction, gradient and an estimated rate of groundwater flow for each sampling event through the 4th quarter of 2022. The flow rate was calculated using the following equation:

$$V_s = \frac{\mathrm{K}dh}{n_e dl}$$

Where

V_s = seepage velocity (distance/time)
K = hydraulic conductivity (distance/time)
dh/dl = hydraulic gradient (unitless)
n_e = effective porosity (unitless)

Hydraulic conductivity values were initially estimated for monitor wells MW-1, MW-4, MW-6, MW-7, and MW-9, screened in the carbonate unit, from slug tests completed by Patrick Engineering in 2010. The geometric mean of the data for these wells was approximately 30 feet per day (ft/d; 3.47 x 10^{-4} ft/sec) for each well, as calculated by Patrick Engineering Hydrogeologic Assessment Report – Will County Station, February, 2011). The slug test data were reviewed as part of the modeling study being completed for the Construction Permit application being completed for Ponds 2S and 3S and the data were reanalyzed using corrected input values for the well casing and borehole dimensions, effective porosity of the sand filter pack material and minor line fitting refinement. The revised geometric mean of the test data for these wells decreased to approximately 20 ft/d (2.315 x 10^{-4} ft/sec) for each well. This revised value was used in Table 9-3. The estimated effective porosity of the aquifer materials (0.2) was obtained from literature (Applied Hydrogeology, Fetter, 1980).

At this time, based on the geology discussion in Section 9.1.1 and the site-specific hydrogeology discussions above, the groundwater beneath the CCR surface impoundment is considered as Class I Potable Resource Groundwater in accordance with 35 Ill. Adm. Code Section 620.210. However, a Groundwater Management Zone (GMZ) in accordance with Section 35 Ill. Adm. Code 620.250 and an Environmental Land Use Control (ELUC) were established where the CCR surface impoundments are located as part of a Compliance Commitment Agreement (CCA) between Midwest Generation and Illinois EPA. The ELUC states that the groundwater shall not be used as potable water. The extent of the established and approved GMZ and ELUC is provided on Figure 9-12.

A survey of all potable water sources within a 2,500 feet radius of the Will County Generating Station was completed by Natural Resources Technology (NRT) in 2009. The following databases and sources of information were utilized in order to determine community water source and water well locations and construction in the vicinity of the ash pond wastewater treatment systems:

- Illinois State Geological Survey (ISGS) -Water Well Database Query;
- Illinois State Water Survey (ISWS) Private Well Database and water well construction report request; and
- Illinois Division of Public Water Supply web-based Geographic System (GIS) files;

As part of this permit preparation, KPRG evaluated the NRT information and reviewed the new Illinois State Geological Survey database and interactive map references as “ILWATER”. The survey results are provided on Figure 9-13. There are no potable use water wells downgradient of Ponds 1N, 1S, 2S, and 3S. There are three existing water wells on the Will County Station property owned by Midwest Generation. These are identified as well numbers 01276, 00253 and 01275 on Figure 9-12. The locations of these wells have been corrected relative to their locations plotted on the ILWATER map. All three wells are greater than 1,500 feet deep. Well 01276 on the north end of the property is no longer in use (retired). Two additional wells located on the property shown as numbers 40018 and 40017 have no backup records (i.e., no installation date information and no depth/log information). Discussions with plant personnel indicate no presence or knowledge of these potential wells suggesting these may be spurious data inputs. The well located on the northeast side of the property (number 40016) within the coal storage pile area is registered to Chicks Romeo Tavern and is actually located approximately 1 mile to the west of the Will County Station along Romeo Road (715 W. Romeo Rd.). There are two wells owned by Isle Ala Cache Park/Museum to the northwest, on the other side of the Des Plaines River which is a regional hydrogeologic boundary. The well noted to the south (number 41780) is associated with the cement operation to the south.

A search of the Illinois Department of Natural Resources dedicated nature preserve database (https://www2.illinois.gov/dnr/INPC/Pages/NaturePreserveDirectory.aspx) was performed to determine whether there may be a nearby dedicated nature preserve. The Romeoville Prairie Nature Preserve is located west of the Des Plaines River and north of Romeo Road, approximately one-quarter mile northwest of the subject impoundments. It is noted that the Des Plaines River is a hydrogeologic barrier and the noted nature preserve is on the other side of the river and upstream relative to surface water flow of the river.

Based on the geology of the site presented in Section 9.1.1 and the above hydrogeology discussions, the primary contaminant migration pathway for a potential release from the subject CCR surface impoundment would be downward migration to groundwater. Due to its proximity to the Des Plaines River, which is the adjacent hydrogeologic flow boundary, minimal to no downward vertical flow mixing is anticipated. There are no other utility or man-made preferential pathway corridors that would act to potentially intercept the flow to move any contamination in a direction other than westerly. There are no potable water wells downgradient of the subject CCR surface impoundments screened within the aquifer of concern. Also, as previously discussed, there are no potable surface water intakes on the Des Plaines River either along or downstream of the subject site.

There is quarterly groundwater quality data associated with Ponds 1N, 1S, 2S, and 3S dating back to December 2010. However, the parameter list established in 2010 was slightly different from that specified in 35 Ill. Adm. Code Section 845.600 and included analysis of dissolved inorganic parameters rather than total inorganic parameters. That historical water quality data is provided in Attachment 9-3.

Pond 2S and Pond 3S were identified as being subject to the new federal requirements under Federal Register, Environmental Protection Agency, 40 CFR Parts 257.94, Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities; Final Rule dated April 17, 2015 (Federal CCR Rule). As required under the Federal CCR Rule, eight rounds of background sampling were completed for the monitoring wells within the monitoring network for the subject CCR surface impoundments (MW-5, MW-6, and MW-9 through MW-12). This included the full list of Appendix III (detection monitoring) and IV (assessment monitoring) parameters. Subsequently, quarterly groundwater monitoring for the first two years, followed by semi-annual groundwater monitoring, of these wells was continued for only Appendix III detection monitoring parameters since there were no detections of Appendix III parameters above the established statistical background for those wells and/or an Alternate Source Demonstration (ASD) was completed indicating a source of impacts other than the subject surface impoundments. Since the effective date of the State CCR Rule, quarterly groundwater monitoring for the full list of parameters specified in 35 Ill. Adm. Code 845.600, which includes all parameters in the Federal

CCR Rule Appendix III/IV, has continued. This data is provided in Table 9-4. In addition, it is noted that Illinois EPA added turbidity measurements to the list with a required eight rounds of background of that parameter for each well in the monitoring network for the subject CCR surface impoundment. This data is provided in Table 9-5. It is noted that the tables include proposed Groundwater Protection Standards (GWPSs) in accordance with 35 Ill. Adm. Code Section 845.600(2). This is further discussed under Section 9.4 below.

Because Pond 1N and Pond 1S did not accumulate liquids, they were not identified as being subject to the federal requirements under Federal Register, Environmental Protection Agency, 40 CFR Parts 257.94, Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities; Final Rule dated April 17, 2015 (Federal CCR Rule). Therefore, the required eight rounds of background sampling for monitoring wells associated with these two ponds (wells MW-1 through MW-4, MW-7, MW-8, and MW-13 through MW-15) were completed between April 2021 and December 2021 with the enactment of the State CCR Rule. There is additional background sampling data starting in 2015 for monitoring well MW-9 since this well is also part of the Ponds 2S/3S monitoring system which was included in the Federal CCR Rule program. As required under the State CCR Rule, all samples collected were analyzed for the full list of parameters specified in 35 Ill. Adm. Code 845.600(a)(1) plus calcium and turbidity. The available CCR monitoring data through second quarter 2023 is provided in Table 9-4.

9.2 Groundwater Monitoring System Design and Construction Plans

A comprehensive monitoring well network was established around Ponds 1N, 1S, 2S, and 3S in 2010 (wells MW-1 through MW-10; see Figure 9-1). The well spacing was developed as part of a previous hydrogeologic assessment by Patrick Engineering, Inc. The well depths were determined based on depth to groundwater and the base elevations of the ponds being monitored and were approved by Illinois EPA. In addition, monitoring wells MW-11 and MW-12 and MW-13 through MW-15 were installed by KPRG and Associates, Inc. (KPRG) in 2015 and April 2021, respectively, to augment the monitoring well network for compliance with the new State CCR Rule. Groundwater flow in the area is generally to the west towards the Des Plaines River. Relative to Pond 1N, monitoring wells MW-1 and MW-2 are upgradient/background monitoring points prior to groundwater flowing under the pond and wells MW-7, MW-14 and MW-15 are downgradient monitoring points. Relative to Pond 1S, wells MW-3 and MW-4 are upgradient/background monitoring points prior to groundwater flowing under the pond and wells MW-8, MW-9 and MW-13 are downgradient monitoring points. It is noted that well MW-9 is also a downgradient monitoring well relative to Ponds 2S. Monitoring wells MW-5 and MW-6 (see Figure 9-1) are the established upgradient/background water quality monitoring points for Ponds 2S and 3S. Wells MW-9, MW-10, MW-11 and MW-12, which are located essentially at the pond boundaries, will serve as down-gradient monitoring points for Ponds 2S and 3S. Groundwater data from the upgradient wells will be evaluated to provide a statistically representative upgradient water quality prior to that water passing beneath the regulated units. This proposed monitoring well network for each pond will be utilized for determining whether potential pond leakage may be causing or contributing to groundwater impacts in the vicinity of the units.

As noted above, monitoring wells MW-1 through MW-10 were installed in 2010 by Patrick Engineering, Inc. Wells MW-11 and MW-12 and wells MW-13 through MW-15 were installed by

KPRG in 2015 and April 2021, respectively. The wells were drilled using 4.25-inch hollow stem augers. The wells were completed with standard 2-inch inner-diameter PVC casing with 10-feet of 0.010 slot PVC screen. Filter sand pack around each screen was extended to approximately 2-feet above the top of the well screen. The remainder of the annulus was backfilled with bentonite. With the exception of well MW-12, surface completions include stick-up (above grade two to three feet) locking protector casings set in concrete aprons. The wells are further protected by traffic bollards, as necessary. Well MW-12 was completed at the surface as a flush mount. Boring logs and well construction summaries for these wells are provided in Attachment 9-2. Top-of-casing elevations were surveyed by an Illinois licensed surveyor and are included in the previously referenced groundwater elevation table in Table 9-2.

Each of the monitoring wells within the sampling network is outfitted with a dedicated sampling system. Specifically, each well has a QED Environmental Systems (QED) Well Wizard Model P1101M dedicated sampling pump with Model No. 37789 intake screens (0.010-inch slot). The screens are set within approximately one foot of the base of the monitoring well.

In accordance with requirements under 35 Ill. Adm. Code Section 845.630(g), an Illinois licensed Professional Engineer certification of the above-defined monitoring system was included in Attachment 9-4 as part of the initial operating permit for Ponds 1N, 1S, 2S, and 3S.

9.3 Groundwater Sampling and Analysis Program

9.3.1 Sample Frequency

Pond 2S and Pond 3S are regulated under the Federal CCR Rule. As such, all of the above defined monitoring wells (upgradient and downgradient) have been sampled on a quarterly basis starting the 4th quarter of 2015 for eight consecutive quarters for both Appendix III and Appendix IV parameters specified in the Federal CCR Rule which is the same parameter listing as provided under the State CCR Rule Section 845.600(a) plus calcium. Eight rounds of groundwater samples were collected from the monitoring well network around Pond 1N and 1S in 2021 and analyzed for the full list of parameters specified in 35 Ill. Adm. Code Section 845.600(a)(1) plus calcium and turbidity. This dataset will facilitate the development of proper statistical evaluation procedures for these ponds and use in development of applicable groundwater protection standards (GWPSs) for each constituent pursuant to 35 Ill. Adm. Code Section 845.600(a)(2). Illinois EPA added turbidity as an additional parameter that required development of a statistical background. However, this restricted period of background data collection does not facilitate evaluation of potential seasonal variations during the development of statistical background concentrations.
Currently, all wells within this CCR monitoring network are being sampled on a quarterly basis for all parameters specified in 35 Ill. Adm. Code Section 845.600(a) plus calcium and turbidity. Between quarterly monitoring events, groundwater level measurements from all designated CCR monitoring wells are also obtained and recorded on a monthly basis along with pond water level reading from gauges established in the ponds, assuming there is standing water within the pond(s).

Quarterly groundwater monitoring will continue during the active life of the impoundments and the post-closure care period or, if closure is by removal, then in accordance with monitoring frequency requirements under 35 Ill. Adm. Code Section 845.740(b). It is noted that if after 5 years of quarterly monitoring it can be demonstrated that the facility meets the requirements specified in 35 Ill. Adm. Code Section 845.650(b)(4), the owner can petition the Illinois EPA to shift the monitoring frequency to semi-annual.

9.3.2 Sampling Preparation and Calibrations

Prior to any sampling event, the Station's designated Environmental Specialist shall be notified in advance of sampling crew arrival so that any arrangements can be made, including security clearance and training.

Prior to sampling activities, and at intervals recommended by the manufacturer, all non-dedicated equipment shall be cleaned and calibrated. Specifically, the field parameter water quality meter to be used for pH, specific conductance, turbidity and temperature will be calibrated using standard reference solutions. In addition, an operational check of the electronic water level probe will also be performed by placing the probe into a bucket of water and ensuring that the audio signal is triggered when the sensor meets the water interface. The associated tape measure of the probe will also be checked for wear.

The monitoring network consists of all dedicated sampling equipment (QED Well Wizard P1101M). The controller used to operate individual bladder pumps will be checked and maintained prior to arrival at the site based on manufacturer specifications.

All lab ware shall be obtained directly from an Illinois certified laboratory. Upon arrival to the site, the monitoring wells will be assessed for structural integrity. Each well cover (either stick-up or flush mount) will be inspected for proper labels, locks, any damage and be cleared of any flora or fauna that may be on the well or in the vicinity that would affect the sample or the sampling operation. In addition to any other notable observations, all of the above shall be entered on the sampling sheets. Once the well is uncovered and unlocked, and the well casing inspected, the well head shall be inspected for damage and cleanliness. At that point, the well will be considered ready for sampling per procedures described below.

9.3.3 Groundwater Sample Collection

Prior to initiating sampling, a round of groundwater levels will be collected from each monitoring well using an electronic water level probe. The timeframe over which these water levels are collected should be minimized and should not exceed 8 hours. The depth to water will be measured to the nearest one-hundredth of a foot from the top of casing using an electronic water level meter. The water level probe should be properly decontaminated between each reading using procedures specified in Section 9.3.4.

All of the monitoring wells at this Station are equipped with dedicated, down-hole, bladder pumps. At the top of casing for each well is a manifold with air and water quick connects and a port for a water level meter probe to fit so that an undisturbed water level can be obtained. Immediately prior to sampling, the depth to water will be measured again to the nearest one-hundredth of a foot from the top of casing using an electronic water level indicator and recorded onto the sampling sheets. Once recorded, an air compressor and flow controller will be attached to the air side quick connect and disposable tubing attached to the discharge connection. The discharge tubing will be run to a flow-through cell of the water quality meter. A discharge line from the flow-through cell will be placed into a vessel to allow for the measurement of the volume of groundwater removed. The water quality meter will be attached within the flow-through cell that allows for real time readings of pH, specific conductivity and temperature. It is noted that a calibration check of the water quality meter should be performed at the start and end of each day of sampling and recorded in the field notes. If the meter calibration-check shows drift outside of manufacturer specifications, the meter should be recalibrated in the field using standard solutions per manufacturer requirements.

Once recorded, an air compressor and flow controller will be attached to the air-side quick connect and disposable tubing attached to the discharge connection. The discharge tubing will be run to a flow-through cell of the water quality meter. A discharge line from the flow-through cell will be placed into a vessel to allow for the measurement of the volume of groundwater removed. The water quality meter will be attached within the flow-through cell that allows for real time readings of pH, specific conductivity and temperature. It is noted that a calibration check of the water quality meter should be performed at the start and end of each day of sampling and recorded in the field notes. If the meter calibration-check shows drift outside of manufacturer specifications, the meter should be recalibrated in the field using standard solutions per manufacturer requirements.

The air controller will be set to the necessary pressure and to the slowest pumping interval, approximately 50 second refill and 10 second pump (flow rates at this setting tend to be less than 100 milliliters/minute), and the compressor will be started. The intent of the low flow pumping will be to minimize drawdown in the well with an ideal goal of keeping the drawdown to 0.30 feet or less. Once the water has filled the flow-through cell, a reading of the parameters will be recorded. Readings will continue to be recorded until such time as all parameters are deemed stable for three consecutive measurements at which point a sample will be collected from the tubing prior to the flow-through cell. An unfiltered groundwater sample shall be collected directly from the water tubing after it is disconnected from the flow-through cell. The laboratory provided bottles shall be properly filled. Once the sample is collected, the bottles shall be properly labeled and placed on ice as necessary.

If the well would pump dry prior to stabilized field parameter readings, the well will be allowed to recover for up to 24-hours at which point water sample collection will be initiated.

In the event that a dedicated bladder pump fails to work, the following procedures should be implemented:

- Pull the dedicated tubing and pump from the well and ensure that the tubing does not come in contact with the ground.

- Visually inspect the intake of the pump for clogging from sedimentation. If clogging is noted, clean the intake with distilled water. If there is no clogging, dismantle the pump casing and inspect the bladder for any holes, cracks or tears.

- If the bladder is determined to be compromised (i.e., wear has resulted in cracking or tearing), remove the bladder and replace it with a new bladder. Properly clean all parts of the pump using procedures described in Section 9.3.4, reassemble the pump and slowly lower it back down hole. Continue sampling as described above.

- If the entire pump is determined to have failed, a new pump will need to be ordered for replacement and a modified sampling procedure will be implemented as described below.

In the case of bladder pump failure at a specific well during a sampling event, the alternate sampling method will be the use of a portable peristaltic pump (the pump itself does not go down-hole) assuming depth to water is less than 23 feet bgs. Clean disposable polyethylene tubing will be attached to the pump and the tubing will be slowly lowered down hole along with the water level probe. The pump will be operated at the lowest rate possible to achieve the same goals as for sampling described above (generally below 300 milliliters/minute, which is within the range of standard low flow protocols). Water will be collected in a clean glass jar for field parameter readings. Once stable field parameters are recorded, the sample will be collected directly into laboratory prepared containers for analysis. Upon completion of sample collection, the water level meter and tubing should be removed from the well. The polyethylene tubing should be disconnected from the pump and discarded. The water level meter should be properly decontaminated as specified in Section 9.3.4. If depth to water is such that a peristaltic pump cannot be used, a submersible pump will need to be used. The submersible pump must be properly cleaned as specified in Section 9.3.4 prior to placement down the well. All subsequent procedures will be the same as above. The alternate sampling pump use will be recorded on the field data sheet for that well and noted in any subsequent reporting summary.

9.3.4 Equipment Decontamination

Any equipment that is used down-hole at more than one sampling location must be thoroughly decontaminated between uses. Based on procedures described above, only the water level meter is anticipated to be in this category, however, if a submersible pump needs to be used during a particular sampling event due to dedicated pump failure (see Section 9.3.3), these procedures will also apply. The water level meter probe and any measuring tape, or any other non-dedicated equipment that may need to be placed down the well that extended below the water surface will need to be cleaned with an Alconox solution, or equivalent, wash followed by a double rinse with distilled water. Any pump tubing that is not dedicated should be discarded and only clean tubing should be used down-hole.

9.3.5 Sample Preservation, Chain-of-Custody and Shipment

Since measurement of total recoverable metals is required by the State CCR Rule, the samples will not be filtered prior to collection. This will facilitate the analysis to capture both the particulate fraction and dissolved fraction of metals in natural groundwater. Groundwater samples will be collected directly into Illinois certified laboratory provided containers. Those containers will be prepared by the laboratory to contain any necessary chemical preservation. The samples shall be stored at temperatures required by the lab following sample collection. Table 9-6 includes a summary of sample bottle requirements, preservatives and holding times.

All groundwater samples collected shall be transferred to the laboratory under proper COC procedures. The laboratory provided COC, completed with all pertinent information, shall be maintained from sample collection through receipt by the laboratory. The information shall include, but is not limited to, the following:

- Project name and number, state samples collected in, sample name and type, time and date collected, analysis requested, and printed name and signatures of person(s) sampling.

The COC shall be completed and properly relinquished by the field sampler(s) with all samples clearly printed or typed.

All samples will be either delivered directly to the laboratory or be shipped using Federal Express or a similar overnight service. It should be noted that Total Dissolved Solids (TDS) analysis has a 7-day holding time. TDS samples should be shipped to the laboratory within 72 hours after collection. All other holding times for the specified parameters are long enough to facilitate one shipment after the full round of sampling is complete.

9.3.6 Analytical Methods

A list of the analytical methods to be used by the laboratory for each specified parameter is included in the above referenced Table 9-6. Individual detection limits for the parameters may change slightly from sample to sample depending on potential matrix interferences with a sample (e.g., amount of suspended solids/sediment) and/or the concentration of the constituent in the sample. However, the base detection limits will be set below the applicable Illinois Class I Drinking Water Standards as defined in 35 Ill. Adm. Code Section 845.600(a)(1) for that compound which are also provided in Table 9-6.

9.3.7 Quality Assurance and Quality Control

Laboratory

Only an Illinois certified analytical laboratory will be used for sample analysis. The laboratory will be conducting their work under their specific approved Quality Assurance and Quality Control (QA/QC) program. A copy of their program can be available upon request. A standard Level II data documentation package will be included in all subsequent reporting, however, the lab will be requested to also provide a Level IV data documentation package (i.e., U.S. EPA Contract Laboratory Protocol equivalent) in the event more detailed data validation/evaluation is deemed necessary.

Field

The QA/QC program for fieldwork will include the collection of blind duplicates. The blind duplicate will be collected from a random well during every sampling event in which more than three (3) samples are collected. The duplicate will be blind in the manner that there will be no way for the laboratory to determine from which well or point the sample was collected.

Upon receipt of the analytical data, a determination will be made if the duplicate is consistent with the sample collected from the well/point. A generally acceptable range for groundwater samples is +/- 30 percent. If outside the acceptable range, a resample may be determined to be necessary and reanalyzed. If there are any questions regarding the duplicate or other reported analytical QA/QC runs, the laboratory will be contacted to determine the effect on data quality, if any, and usability. If necessary, a specific well may need to be re-sampled.

9.3.8 Statistical Methods

A proposed statistical evaluation plan meeting the requirements specified in 35 Ill. Adm. Code Section 845.640(f) was included in Attachment 9-5 as part of the initial operating permits for Ponds 1N, 1S, 2S, and 3S.

9.4 Groundwater Monitoring Program Section

The groundwater sample and water level collection frequency is discussed in Section 9.3.1 above.

As previously noted, the monitoring well system for the subject units consists of fifteen (15) monitoring wells as follows:

- MW-01 and MW-02 – Upgradient/background for Pond 1N
- MW-07, MW-14 and MW-15 – Downgradient for Pond 1N
- MW-03 and MW-04 – Upgradient/background for Pond 1S
- MW-08, MW-09 and MW-13 – Downgradient for Pond 1S
- MW-5 and MW-6 – Upgradient/background for Ponds 2S and 3S
- MW-9, MW-10, MW-11, and MW-12 – Downgradient for Ponds 2S and 3S

Eight rounds of background sampling for the purposes of statistical evaluation and background determination for Ponds 2S and 3S is available from the initial groundwater sampling which occurred starting in 2015 in compliance with the Federal CCR Rule requirements. Subsequent groundwater sampling for Ponds 2S and 3S has also occurred on a quarterly basis for the seven detection monitoring parameters listed under Appendix III of the Federal CCR Rule detection monitoring requirements. All available CCR monitoring data through the end of the second quarter 2023 is summarized in Table 9-4 and the rounds of turbidity data collected since the enactment of the State CCR Rule in April 2021 in Table 9-5.

Eight rounds of background sampling for the purposes of statistical evaluation and background determination for Ponds 1N and 1S have been collected between April 2021 and December 2021. As previously noted, downgradient well MW-09 has additional sampling data extending back to 2015 as this well is also part of the CCR monitoring network for Ponds 2S and 3S, which are part of Federal CCR monitoring. All available CCR monitoring data through the end of the second quarter 2023 is provided in Table 9-4 and the rounds of turbidity data collected since the enactment of the State CCR Rule in April 2021 in Table 9-5.

Using the currently available data for the subject CCR surface impoundments, site-specific proposed Groundwater Protection Standards (GWPSs) have been established in accordance with 35 Ill. Adm. Code Sections 845.600(a)(2) and 845.600(b) and are summarized in Table 9-7 for Pond 1N, Table 9-8 for Pond 1S, and Table 9-9 for Ponds 2S and 3S. The background concentrations noted in the tables were calculated using the statistical evaluation approach noted in Section 9.3.7. A presentation of the statistical evaluations, which resulted in the background concentration calculations, was included in Attachment 9-6 as part of the initial operating permits for Ponds 1N, 1S, 2S, and 3S.

Once the proposed GWPSs presented in this permit application are approved by Illinois EPA, these values will be used for all subsequent groundwater monitoring data comparisons. Monitoring will continue on a quarterly basis for all constituents specified in 35 Ill. Adm. Code Section 845.600(a)(1) plus calcium and turbidity. In accordance with 35 Ill. Adm. Code Section 845.610(b)(3)(D), a data summary report will be submitted to Illinois EPA within 60-days of receipt of all analytical data (including resample data if necessary as discussed below) which will include a data summary with a comparison against the established/approved GWPSs. This report must be placed the facility's operating record.

If during a monitoring event, a constituent(s) is/are detected above an established and approved GWPS, that monitoring well will be resampled for the specific constituent(s) determined above the GWPS. If the resample data confirms that the constituent(s) concentration(s) is/are above the GWPS then the following will occur:

- Characterize the nature and extent of the potential release and any relevant site conditions that may affect the remedy evaluation/selection. This characterization must meet the requirements set forth under 35 Ill. Adm. Code Section 845.650(d)(1).

- If groundwater impacts extend off-site, provide off-site landowner/resident notifications as specified under 35 Ill. Adm. Code Section 845.650(d)(2) and place the notifications into the facility's operating record. This must occur within no more than 30-days of determination that a GWPS has been exceeded.

- An Alternate Source Demonstration (ASD) may be initiated and completed for submittal to Illinois EPA review/approval as allowed under 35 Ill. Adm. Code Section 845.650(e). Place the ASD into the facility's operating record.

- Within 90-days of determining that a constituent(s) was detected above an established/approved GWPS at a downgradient waste boundary monitoring point, initiate an assessment of corrective measures meeting the requirements specified under 35 Ill. Adm. Code Section 845.660 unless an ASD is submitted in accordance with 35 Ill. Adm. Code Section 845.650(d)(2) and subsequently approved by the Illinois EPA.

By no later January 31st of each year, an Annual Groundwater Monitoring and Corrective Action Report will be prepared for inclusion as part of an Annual Consolidated Report for the facility. The Annual Groundwater Monitoring and Corrective Action Report will meet the requirements set forth under 35 Ill. Adm. Code Section 845.610(e)(1 through 4). The Annual Consolidated Report will be placed into the facility's operating record.

10.0 Professional Engineer Certification, 845.220(a)(8)

This construction permit application has been prepared to meet the requirements of 35 Ill. Adm. Code 845.220(a) and 845.220(d).

JOSHUA D. DAVENPORT
062-061945

Joshua D. Davenport, P.E.
Illinois Professional Engineer

11.0 Owner Certification, 845.220(a)(9)

A certification stating that the owner or operator of the CCR surface impoundment has completed the public notification and public meetings that are required under the Ill. Adm. Code Title 35, Part 845 Section 240 is included in Attachment 11. Also included is a summary of the issues raised by the public and a summary of any revisions, determinations, or other considerations made in response to those issues. A list of interested persons in attendance who would like to be added to the Agent's list for the facility.

CONSTRUCTION PERMIT TABLES

Table 2: Will County Generating Station
Pond 2S CCR Chemical Constituents Analytical Results

Parameter Name	Pond 2S Sample 10/11/2021
Sulfate	110
Chloride	41
Fluoride	<0.99
Antimony	<1.7
Arsenic	1.3
Beryllium	1.4
Boron	110
Cadmium	<0.17
Chromium	7.8
Lead	3.9
Lithium	20
Molybdenum	1.5
Thallium	1.2
Barium	2,200
Calcium	78,000
Cobalt	8.7
Selenium	<4.3
Radium 226 & 228	1.31
Mercury	<0.016

Notes:

All units are in milligrams per kilogram (mg/kg)

Table 9-1. Summary of Local Precipitation Data - Midwest Generation, LLC, Will County Generating Station, Romeoville, Illinois.

Will County Station	
Month	**Average Monthly Precipitation* (inches)**
January	1.87
February	1.73
March	2.11
April	3.56
May	3.87
June	3.75
July	3.54
August	3.28
September	3.04
October	3.04
November	2.41
December	1.95

Notes:

* - Historical precipitation data was obtained from the National Oceanic and Atmospheric Administration. Precipitation data was averaged from three stations located within Romeoville, St. Charles and Plainfield, Illinois. Dates of precipitation data range from 1988-2020.

Table 9-2. CCR Groundwater Elevations All Wells - Midwest Generation, LLC, Will County Station, Romeoville, IL

Well ID	Date	Top of Casing (TOC) Elevation (ft above MSL)	Groundwater Elevation (ft above MSL)	Depth to Groundwater (ft below TOC)
MW-01	2/4/2015	592.95	583.12	9.83
	4/30/2015	592.95	583.19	9.76
	7/27/2015	592.95	583.09	9.86
	11/9/2015	592.95	583.12	9.83
	2/16/2016	592.95	583.22	9.73
	5/24/2016	592.95	583.20	9.75
	8/9/2016	592.95	583.09	9.86
	10/25/2016	592.95	583.11	9.84
	1/31/2017	592.95	583.31	9.64
	5/10/2017	592.95	583.44	9.51
	9/8/2017	592.95	583.00	9.95
	11/15/2017	592.95	583.19	9.76
	2/28/2018	592.95	583.55	9.40
	5/2/2018	592.95	583.24	9.71
	7/24/2018	592.95	583.14	9.81
	10/2/2018	592.95	583.06	9.89
	2/19/2019	592.95	583.33	9.62
	5/28/2019	592.95	584.01	8.94
	8/21/2019	592.95	582.38	10.57
	12/5/2019	592.95	582.91	10.04
	2/18/2020	592.95	582.89	10.06
	5/26/2020	592.95	583.33	9.62
	8/5/2020	592.95	582.52	10.43
	11/3/2020	592.95	582.10	10.85
	3/1/2021	592.95	583.13	9.82
	5/24/2021	592.95	582.65	10.30
	6/7/2021	592.95	582.45	10.50
	7/12/2021	592.95	582.83	10.12
	8/23/2021	592.95	581.84	11.11
	11/19/2021	592.95	582.46	10.49
MW-02	2/4/2015	593.99	582.89	11.10
	5/1/2015	593.99	583.02	10.97
	7/27/2015	593.99	582.89	11.10
	11/9/2015	593.99	582.89	11.10
	2/16/2016	594.00	583.08	10.92
	5/24/2016	594.00	583.07	10.93
	8/9/2016	594.00	582.85	11.15
	10/25/2016	594.00	582.87	11.13
	1/31/2017	594.00	583.15	10.85
	5/10/2017	594.00	583.54	10.46
	9/7/2017	594.00	582.67	11.33
	11/15/2017	594.00	583.02	10.98
	2/28/2018	594.00	583.61	10.39
	5/2/2018	594.00	583.09	10.91
	7/24/2018	594.00	582.92	11.08
	10/2/2018	594.00	582.76	11.24
	2/19/2019	594.00	583.24	10.76
	5/28/2019	594.00	584.11	9.89
	8/21/2019	594.00	582.29	11.71
	12/5/2019	594.00	582.85	11.15
	2/18/2020	594.00	582.82	11.18
	5/22/2020	594.00	583.98	10.02
	8/5/2020	594.00	582.41	11.59
	11/3/2020	594.00	581.99	12.01
	3/1/2021	594.00	583.05	10.95
	5/24/2021	594.00	582.51	11.49
	6/7/2021	594.00	581.75	12.25
	7/12/2021	594.00	582.20	11.80
	8/23/2021	594.00	581.75	12.25
	11/19/2021	594.00	582.20	11.80
MW-03	2/4/2015	593.51	583.17	10.34
	5/1/2015	593.51	583.27	10.24
	7/28/2015	593.51	582.98	10.53
	11/9/2015	593.51	583.15	10.36
	2/16/2016	593.51	583.23	10.28
	5/24/2016	593.51	583.19	10.32
	8/9/2016	593.51	582.88	10.63
	10/25/2016	593.51	583.14	10.37
	1/31/2017	593.51	583.30	10.21
	5/11/2017	593.51	583.52	9.99
	9/8/2017	593.51	582.63	10.88
	11/16/2017	593.51	583.17	10.34
	2/28/2018	593.51	583.70	9.81
	5/2/2018	593.51	583.20	10.31
	7/24/2018	593.51	583.01	10.50
	10/2/2018	593.51	582.79	10.72
	2/20/2019	593.51	583.33	10.18
	5/28/2019	593.51	584.51	9.00
	8/21/2019	593.51	581.98	11.53
	12/5/2019	593.51	583.03	10.48
	2/18/2020	593.51	582.95	10.56
	5/26/2020	593.51	583.43	10.08
	8/5/2020	593.51	582.22	11.29
	11/3/2020	593.51	581.90	11.61
	3/1/2021	593.51	583.09	10.42
	5/24/2021	593.51	582.69	10.82
	6/7/2021	593.51	582.28	11.23
	7/12/2021	593.51	582.81	10.70
	8/23/2021	593.51	581.36	12.15
	11/19/2021	593.51	582.59	10.92

Table 9-2. CCR Groundwater Elevations All Wells - Midwest Generation, LLC, Will County Station, Romeoville, IL

Well ID	Date	Top of Casing (TOC) Elevation (ft above MSL)	Groundwater Elevation (ft above MSL)	Depth to Groundwater (ft below TOC)
MW-04	2/4/2015	593.95	582.93	11.02
	5/1/2015	593.95	583.06	10.89
	7/28/2015	593.95	582.78	11.17
	11/9/2015	593.95	582.87	11.08
	2/16/2016	593.93	582.94	10.99
	5/24/2016	593.93	582.91	11.02
	8/9/2016	593.93	582.74	11.19
	10/25/2016	593.93	582.89	11.04
	1/31/2017	593.93	583.06	10.87
	5/11/2017	593.93	583.26	10.67
	9/8/2017	593.93	582.39	11.54
	11/16/2017	593.93	582.85	11.08
	2/28/2018	593.93	583.46	10.47
	5/2/2018	593.93	582.94	10.99
	7/24/2018	593.93	582.72	11.21
	10/2/2018	593.93	582.33	11.60
	2/20/2019	593.93	583.85	10.08
	5/28/2019	593.93	584.25	9.68
	8/21/2019	593.93	582.14	11.79
	12/5/2019	593.93	582.93	11.00
	2/18/2020	593.93	582.87	11.06
	5/26/2020	593.93	583.25	10.68
	8/5/2020	593.93	582.38	11.55
	11/4/2020	593.93	582.28	11.65
	3/1/2021	593.93	583.32	10.61
	5/24/2021	593.93	582.65	11.28
	6/7/2021	593.93	582.38	11.55
	7/12/2021	593.93	582.73	11.20
	8/23/2021	593.93	582.53	11.40
	11/19/2021	593.93	582.57	11.36
MW-05	2/3/2015	592.87	582.96	9.91
	5/1/2015	592.87	583.03	9.84
	7/28/2015	592.87	582.78	10.09
	11/9/2015	592.87	582.88	9.99
	2/16/2016	592.87	582.96	9.91
	5/24/2016	592.87	582.93	9.94
	8/9/2016	592.87	582.78	10.09
	10/25/2016	592.87	583.85	9.02
	1/31/2017	592.87	583.06	9.81
	5/11/2017	592.87	583.24	9.63
	9/8/2017	592.87	582.39	10.48
	11/16/2017	592.87	582.85	10.02
	2/28/2018	592.87	583.39	9.48
	5/2/2018	592.87	582.93	9.94
	7/25/2018	592.87	582.69	10.18
	10/2/2018	592.87	582.23	10.64
	2/20/2019	592.87	583.14	9.73
	5/28/2019	592.87	584.14	8.73
	8/21/2019	592.87	582.23	10.64
	12/5/2019	592.87	582.95	9.92
	2/18/2020	592.87	582.89	9.98
	5/22/2020	592.87	583.48	9.39
	8/5/2020	592.87	582.38	10.49
	11/3/2020	592.87	582.39	10.48
	3/1/2021	592.87	583.35	9.52
	5/24/2021	592.87	582.66	10.21
	6/7/2021	592.87	582.39	10.48
	7/12/2021	592.87	582.86	10.01
	8/23/2021	592.87	581.63	11.24
	11/19/2021	592.87	582.62	10.25
MW-06	2/3/2015	592.97	581.66	11.31
	4/30/2015	592.97	581.93	11.04
	7/28/2015	592.97	581.67	11.30
	11/9/2015	592.97	583.01	9.96
	2/16/2016	592.97	581.60	11.37
	5/24/2016	593.18	581.81	11.37
	8/9/2016	593.18	581.64	11.54
	10/25/2016	593.18	581.81	11.37
	1/31/2017	593.18	581.94	11.24
	5/11/2017	593.18	582.32	10.86
	9/7/2017	593.18	581.41	11.77
	11/16/2017	593.18	581.69	11.49
	2/28/2018	593.18	582.27	10.91
	5/3/2018	593.18	581.71	11.47
	7/25/2018	593.18	581.67	11.51
	10/2/2018	593.18	581.29	11.89
	2/20/2019	593.18	581.95	11.23
	5/28/2019	593.18	583.00	10.18
	8/21/2019	593.18	581.50	11.68
	12/5/2019	593.18	581.67	11.51
	2/18/2020	593.18	581.76	11.42
	5/22/2020	593.18	582.63	10.55
	8/5/2020	593.18	581.25	11.93
	11/3/2020	593.18	581.32	11.86
	3/1/2021	593.18	582.09	11.09
	5/24/2021	593.18	581.33	11.85
	6/7/2021	593.18	581.19	11.99
	7/12/2021	593.18	582.39	10.79
	8/23/2021	593.18	580.77	12.41
	11/19/2021	593.18	581.33	11.85

Table 9-2. CCR Groundwater Elevations All Wells - Midwest Generation, LLC, Will County Station, Romeoville, IL

Well ID	Date	Top of Casing (TOC) Elevation (ft above MSL)	Groundwater Elevation (ft above MSL)	Depth to Groundwater (ft below TOC)
MW-07	2/3/2015	592.88	581.79	11.09
	4/30/2015	592.88	582.10	10.78
	7/27/2015	592.88	581.42	11.46
	11/9/2015	592.88	581.75	11.13
	2/16/2016	592.88	582.02	10.86
	5/24/2016	592.89	581.81	11.08
	8/9/2016	592.89	581.46	11.43
	10/25/2016	592.89	581.73	11.16
	1/31/2017	592.89	582.28	10.61
	5/9/2017	592.89	582.73	10.16
	9/7/2017	592.89	581.22	11.67
	11/14/2017	592.89	582.09	10.80
	2/27/2018	592.89	582.80	10.09
	5/1/2018	592.89	582.14	10.75
	7/25/2018	592.89	581.58	11.31
	10/2/2018	592.89	581.51	11.38
	2/19/2019	592.89	582.35	10.54
	5/28/2019	592.89	583.33	9.56
	8/21/2019	592.89	581.51	11.38
	12/5/2019	592.89	582.28	10.61
	2/18/2020	592.89	582.19	10.70
	5/26/2020	592.89	583.23	9.66
	8/5/2020	592.89	581.42	11.47
	11/3/2020	592.89	581.39	11.50
	3/1/2021	592.89	582.40	10.49
	5/24/2021	592.89	581.47	11.42
	6/11/2021	592.89	580.92	11.97
	7/12/2021	592.89	581.69	11.20
	8/23/2021	592.89	580.92	11.97
	11/19/2021	592.89	581.69	11.20
MW-08	2/3/2015	592.71	581.25	11.46
	4/30/2015	592.71	581.48	11.23
	7/27/2015	592.71	581.10	11.61
	11/9/2015	592.71	581.36	11.35
	2/16/2016	592.71	581.60	11.11
	5/24/2016	592.75	581.46	11.29
	8/9/2016	592.75	580.99	11.76
	10/25/2016	592.75	581.31	11.44
	1/31/2017	592.75	581.77	10.98
	5/9/2017	592.75	582.20	10.55
	9/6/2017	592.75	580.80	11.95
	11/14/2017	592.75	581.44	11.31
	2/27/2018	592.75	582.45	10.30
	5/1/2018	592.75	581.53	11.22
	7/25/2018	592.75	581.11	11.64
	10/2/2018	592.75	580.97	11.78
	2/19/2019	592.75	582.02	10.73
	5/28/2019	592.75	581.85	10.90
	8/21/2019	592.75	582.05	10.70
	12/5/2019	592.75	581.81	10.94
	2/18/2020	592.75	581.77	10.98
	5/26/2020	592.75	582.97	9.78
	8/5/2020	592.75	580.86	11.89
	11/3/2020	592.75	581.35	11.40
	3/1/2021	592.75	582.20	10.55
	5/24/2021	592.75	581.04	11.71
	6/7/2021	592.75	579.95	12.80
	7/12/2021	592.75	581.20	11.55
	8/23/2021	592.75	580.54	12.21
	11/19/2021	592.75	581.13	11.62
MW-09	2/3/2015	592.84	581.97	10.87
	4/30/2015	592.84	581.57	11.27
	7/27/2015	592.84	581.31	11.53
	11/9/2015	592.84	581.46	11.38
	2/16/2016	592.84	581.81	11.03
	5/24/2016	592.87	581.52	11.35
	8/9/2016	592.87	581.44	11.43
	10/25/2016	592.87	582.13	10.74
	1/31/2017	592.87	581.72	11.15
	5/9/2017	592.87	582.42	10.45
	9/6/2017	592.87	580.92	11.95
	11/14/2017	592.87	581.33	11.54
	2/27/2018	592.87	582.74	10.13
	5/1/2018	592.87	581.48	11.39
	7/25/2018	592.87	581.11	11.76
	10/2/2018	592.87	580.96	11.91
	2/192019	592.87	582.59	10.28
	5/28/2019	592.87	583.22	9.65
	8/21/2019	592.87	581.31	11.56
	12/5/2019	592.87	581.70	11.17
	2/18/2020	592.87	581.68	11.19
	5/26/2020	592.87	583.20	9.67
	8/5/2020	592.87	581.10	11.77
	11/3/2020	592.87	580.97	11.90
	3/1/2021	592.87	581.96	10.91
	5/24/2021	592.87	580.85	12.02
	6/7/2021	592.87	580.68	12.19
	7/12/2021	592.87	581.58	11.29
	8/23/2021	592.87	580.77	12.10
	11/19/2021	592.87	581.03	11.84

Table 9-2. CCR Groundwater Elevations All Wells - Midwest Generation, LLC, Will County Station, Romeoville, IL

Well ID	Date	Top of Casing (TOC) Elevation (ft above MSL)	Groundwater Elevation (ft above MSL)	Depth to Groundwater (ft below TOC)
MW-10	2/3/2015	590.98	580.12	10.86
	4/30/2015	590.98	580.37	10.61
	7/27/2015	590.98	580.11	10.87
	11/9/2015	590.98	580.33	10.65
	2/16/2016	590.98	580.55	10.43
	5/24/2016	590.96	580.24	10.72
	8/9/2016	590.96	579.84	11.12
	10/25/2016	590.96	580.23	10.73
	1/31/2017	590.96	580.59	10.37
	5/10/2017	590.96	581.18	9.78
	9/7/2017	590.96	579.76	11.20
	11/15/2017	590.96	580.20	10.76
	2/27/2018	590.96	581.42	9.54
	5/1/2018	590.96	580.32	10.64
	7/25/2018	590.96	579.78	11.18
	10/2/2018	590.96	579.84	11.12
	2/20/2019	590.96	580.92	10.04
	5/28/2019	590.96	581.94	9.02
	8/21/2019	590.96	580.31	10.65
	12/5/2019	590.96	580.68	10.28
	2/18/2020	590.96	580.57	10.39
	5/27/2020	590.96	582.07	8.89
	8/5/2020	590.96	579.90	11.06
	11/3/2020	590.96	580.28	10.68
	3/1/2021	590.96	581.25	9.71
	5/24/2021	590.96	579.90	11.06
	6/7/2021	590.96	579.54	11.42
	7/12/2021	590.96	580.56	10.40
	8/23/2021	590.96	579.66	11.30
	11/19/2021	590.96	580.24	10.72
MW-11	11/9/2015	590.69	10.28	580.41
	2/16/2016	590.69	10.15	580.54
	5/24/2016	590.69	10.25	580.44
	8/9/2016	590.69	10.66	580.03
	10/25/2016	590.69	10.42	580.27
	1/31/2017	590.69	9.91	580.78
	5/9/2017	590.69	9.21	581.48
	6/27/2017	590.69	10.48	580.21
	9/6/2017	590.69	10.73	579.96
	11/15/2017	590.69	10.43	580.26
	5/1/2018	590.69	10.18	580.51
	10/2/2018	590.69	10.59	580.10
	5/28/2019	590.69	8.32	582.37
	12/5/2019	590.69	9.85	580.84
	5/26/2020	590.69	8.09	582.60
	11/3/2020	590.69	10.58	580.11
	5/24/2021	590.69	10.76	579.93
	6/11/2021	590.69	11.05	579.64
	7/12/2021	590.69	9.77	580.92
	8/23/2021	590.69	10.75	579.94
	11/19/2021	590.69	10.60	580.09
MW-12	11/9/2015	590.81	10.15	580.66
	2/16/2016	590.81	10.24	580.57
	5/24/2016	590.81	10.31	580.50
	8/9/2016	590.81	10.73	580.08
	10/25/2016	590.81	10.45	580.36
	1/31/2017	590.81	10.16	580.65
	5/9/2017	590.81	9.88	580.93
	6/27/2017	590.81	10.62	580.19
	9/6/2017	590.81	10.61	580.20
	11/15/2017	590.81	10.20	580.61
	5/1/2018	590.81	10.30	580.51
	10/2/2018	590.81	10.77	580.04
	5/28/2019	590.81	9.17	581.64
	12/5/2019	590.81	10.15	580.66
	5/22/2020	590.81	9.88	580.93
	11/3/2020	590.81	10.49	580.32
	5/24/2021	590.81	10.65	580.16
	6/7/2021	590.81	11.00	579.81
	7/12/2021	590.81	9.98	580.83
	8/23/2021	590.81	11.05	579.76
	11/19/2021	590.81	10.48	580.33
MW-13	5/24/2021	592.80	10.92	581.88
	6/7/2021	592.80	11.02	581.78
	7/12/2021	592.80	10.90	581.90
	8/23/2021	592.80	11.30	581.50
	11/19/2021	592.80	10.85	581.95
MW-14	5/24/2021	592.70	10.79	581.91
	6/7/2021	592.70	10.99	581.71
	7/12/2021	592.70	10.58	582.12
	8/23/2021	592.70	11.35	581.35
	11/19/2021	592.70	10.95	581.75
MW-15	5/24/2021	592.89	10.24	582.65
	6/7/2021	592.89	10.56	582.33
	7/12/2021	592.89	10.11	582.78
	8/23/2021	592.89	11.02	581.87
	11/19/2021	592.89	10.30	582.59

Table 9-3. Hydraulic Gradient, Direction and Seepage Velocity. Midwest Generation, LLC, Will County Generation Station.

DATE	Groundwater Flow Direction	K_{avg} (ft/sec)*	Average Hydraulic Gradient (ft/ft)	Porosity (unitless)**	Estimated Seepage Velocity (ft/day)
11/9/2015	West	2.310E-04	0.0053	0.2	0.53
2/16/2016	West	2.310E-04	0.0030	0.2	0.29
5/24/2016	West	2.310E-04	0.0030	0.2	0.29
8/9/2016	West	2.310E-04	0.0030	0.2	0.29
10/25/2016	West	2.310E-04	0.0030	0.2	0.29
1/31/2017	West	2.310E-04	0.0030	0.2	0.29
5/9/2017	West	2.310E-04	0.0045	0.2	0.45
6/27/2017	West	2.310E-04	0.0049	0.2	0.49
9/6/2017	West	2.310E-04	0.0047	0.2	0.47
11/16/2017	West	2.310E-04	0.0026	0.2	0.26
5/1/2018	West	2.310E-04	0.0025	0.2	0.25
10/2/2018	West	2.310E-04	0.0040	0.2	0.40
5/28/2019	West	2.310E-04	0.0027	0.2	0.27
12/5/2019	West	2.310E-04	0.0027	0.2	0.27
5/22/2020	West	2.310E-04	0.0029	0.2	0.29
11/3/2020	West	2.310E-04	0.0074	0.2	0.73
5/24/2021	West	2.310E-04	0.0049	0.2	0.49

* K_{avg} - Geometric mean hydraulic conductivity (feet/second) as discussed in Section 9.1.2.

** - Porosity estimate from Groundwater, Freeze and Cherry, 1979.

Table 9-3. Groundwater Flow Direction and Estimated Seepage Velocity/Flow Rate - Will County Generation Station. Ponds 1N-1S.

DATE	Groundwater Flow Direction	K_{avg} (ft/sec)*	Average Hydraulic Gradient (ft/ft)	Porosity (unitless)**	Estimated Seepage Velocity (ft/day)
5/24/2021	West	2.315E-04	0.0096	0.2	0.96
6/7/2021	West	2.315E-04	0.0090	0.2	0.90
7/12/2021	West	2.315E-04	0.0057	0.2	0.57
8/23/2021	West	2.315E-04	0.0028	0.2	0.28
11/19/2021	West	2.315E-04	0.0069	0.2	0.69

* Kavg - Pre-2021 K values from Hydrologic Assessment Report, Patrick Engineering, February 2011. 2021 K values from re-evaluation of slug test data as part of groundwater modeling in support of Application for Construction Permit per Illinois State CCR Rule.

** - Porosity estimate from Groundwater, Freeze and Cherry, 1979.

Table 9-4. Groundwater Analytical Results-Midwest Generation, LLC, Will County Station, Romeoville, IL. Pond 1N.

Well	Date	Boron	Calcium	Chloride	Fluoride	pH	Sulfate	Total Dissolved Solids	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Lead	Lithium	Mercury	Molybdenum	Radium 226 + 228 Combined	Selenium	Thallium
MW-01 up-gradient	5/3/2021	2.6	170	F1 21	0.62	6.83	390	1200	< 0.003	< 0.001	0.095	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.034	< 0.0002	0.012	0.623	0.0093	< 0.002
	5/24/2021	2.5	200	18	0.63	6.86	350	1100	< 0.003	< 0.001	0.093	^1+ < 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.036	< 0.0002	F1 < 0.012	0.953	0.012	< 0.002
	6/7/2021	3.0	200	18	0.63	6.52	380	510	< 0.003	< 0.001	0.096	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.037	< 0.0002	0.013	< 0.372	0.01	< 0.002
	6/25/2021	B 2.6	200	20	0.59	6.64	410	1200	^+ < 0.003	< 0.001	0.097	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.037	< 0.0002	0.014	0.672	0.0042	< 0.002
	7/12/2021	2.4	190	16	0.60	6.55	320	1000	< 0.003	0.0012	0.100	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.045	< 0.0002	0.013	0.457	0.012	< 0.002
	8/2/2021	2.4	200	18	0.65	6.57	410	1300	< 0.003	0.001	0.100	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.044	< 0.0002	0.014	0.478	0.0095	< 0.002
	8/23/2021	2.4	200	18	0.61	6.99	400	1100	< 0.003	< 0.001	0.100	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.044	< 0.0002	0.014	0.697	0.0058	< 0.002
	11/19/2021	2.0	170	29	0.56	6.62	260	970	< 0.003	< 0.001	0.090	^1+ < 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.038	< 0.0002	0.0098	1.16	0.017	< 0.002
	2/21/2022	2.0	190	26	0.55	6.63	370	1200	< 0.003	< 0.001	0.086	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.032	< 0.0002	0.011	0.773	0.0079	< 0.002
	6/15/2022	2.6	180	33	0.61	6.43	350	1100	< 0.003	< 0.001	0.09	< 0.001	0.00054	< 0.005	< 0.001	< 0.0005	0.033	< 0.0002	0.015	0.945	0.0087	< 0.002
	8/24/2022	2.7	180	24	0.61	6.51	370	1400	< 0.003	< 0.001	0.093	< 0.001	^1+ 0.00092	< 0.005	0.0016	0.00078	0.038	< 0.0002	0.015	0.581	0.0047	< 0.002
	11/15/2022	2.9	190	22	1	6.59	360	1100	< 0.003	0.0011	0.097	< ^+ 0.001	0.00052	< 0.005	0.001	0.00057	0.039	< 0.0002	0.014	< 0.63	0.0085	< 0.002
	2/22/2023	2	170	29	0.49	6.93	360	1000	< 0.003	< 0.001	0.082	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.031	< 0.0002	0.013	< 0.544	0.0092	< 0.002
	4/27/2023	2.4	120	77	0.69	6.79	400	1100	< 0.0030	< 0.0010	0.065	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	0.028	< 0.00020	0.041	0.824	< 0.0025	< 0.0020
MW-02 up-gradient	5/3/2021	5.3	87	28	0.41	7.76	500	1100	< 0.003	0.009	0.058	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.046	< 0.0002	0.072	1.3	< 0.0025	< 0.002
	5/24/2021	5.2	88	24	0.41	7.77	550	1100	< 0.003	0.0099	0.059	^1+ < 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.047	< 0.0002	0.07	1.19	< 0.0025	< 0.002
	6/7/2021	6.5	100	25	0.4	7.60	540	1100	< 0.003	0.011	0.057	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.045	< 0.0002	0.081	0.54	< 0.0025	< 0.002
	6/28/2021	B 5.3	95	23	0.36	7.93	500	1200	^+ < 0.003	0.012	0.059	< 0.001	< 0.0005	0.0057	< 0.001	< 0.0005	0.046	< 0.0002	0.075	0.8	< 0.0025	< 0.002
	7/12/2021	5.2	97	21	0.37	7.53	480	970	< 0.003	0.012	0.067	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.051	< 0.0002	0.071	1.07	< 0.0025	< 0.002
	8/2/2021	4.8	92	24	0.37	7.54	520	1200	< 0.003	0.011	0.06	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.048	< 0.0002	0.073	0.798	< 0.0025	< 0.002
	8/23/2021	5.0	92	26	0.38	8.02	530	830	< 0.003	0.011	0.06	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.048	< 0.0002	0.075	0.986	< 0.0025	< 0.002
	11/19/2021	5.2	86	27	0.38	7.72	520	1100	< 0.003	0.014	0.057	^1+ < 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.041	< 0.0002	0.068	1.43	< 0.0025	< 0.002
	2/21/2022	4.9	92	32	0.43	7.65	550	1100	< 0.003	0.01	0.06	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.044	< 0.0002	0.083	< 0.848	< 0.0025	< 0.002
	6/15/2022	5.3	91	30	0.39	7.32	460	1100	< 0.003	0.01	0.058	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.044	< 0.0002	0.073	1.17	< 0.0025	< 0.002
	8/24/2022	5.6	81	28	0.38	7.73	480	1100	< 0.003	0.015	0.059	< 0.001	< ^1+ 0.0005	< 0.005	< 0.001	< 0.0005	0.043	< 0.0002	0.07	0.984	< 0.0025	< 0.002
	11/15/2022	6.5	99	27	0.64	7.64	530	1000	< 0.003	0.017	0.069	< ^+ 0.001	< 0.0005	< 0.005	< 0.001	0.00052	0.047	< 0.0002	0.076	2.13	< 0.0025	< 0.002
	2/22/2023	4.6	89	29	0.38	7.86	460	980	< 0.003	0.0095	0.06	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.042	< 0.0002	0.075	0.974	< 0.0025	< 0.002
	4/27/2023	4.6	83	29	0.37	7.60	430	1000	< 0.0030	0.0088	0.053	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	0.043	< 0.00020	0.072	0.961	< 0.0025	< 0.0020
MW-07 down gradient	5/4/2021	4.0	130	110	0.69	8.29	490	1000	< 0.003	0.0022	0.063	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.026	< 0.0002	0.051	0.952	< 0.0025	< 0.002
	5/24/2021	4.2	150	140	0.53	8.38	590	1400	< 0.003	0.0022	0.064	^1+ < 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.028	< 0.0002	0.049	1.28	< 0.0025	< 0.0025
	6/7/2021	4.0	110	120	0.69	7.62	480	1000	< 0.003	0.0026	0.064	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.022	< 0.0002	0.07	1.25	< 0.0025	< 0.002
	6/25/2021	B 6.0	290	250	0.42	6.35	850	2300	^+ < 0.003	0.0024	0.12	< 0.001	< 0.0005	0.034	0.0012	< 0.0005	0.032	< 0.0002	0.051	0.694	0.0039	< 0.002
	7/12/2021	4.6	230	170	0.65	6.87	510	1400	< 0.003	0.0044	0.063	^+ < 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.039	< 0.0002	0.05	1.4	0.0031	< 0.002
	8/2/2021	3.1	120	130	0.69	7.97	450	980	< 0.003	0.0036	0.071	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.024	< 0.0002	0.068	1.07	< 0.0025	< 0.002
	8/25/2021	2.8	80	130	0.73	8.63	420	800	< 0.003	0.0027	0.059	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.019	< 0.0002	0.076	1.21	< 0.0025	< 0.002
	11/19/2021	3.9	170	190	0.48	6.62	680	1800	< 0.003	0.0065	0.048	^+ < 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.023	< 0.0002	0.033	2.4	< 0.0025	< 0.002
	2/22/2022	2.6	160	130	0.42	6.50	290	1200	< 0.003	0.0012	0.059	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.022	< 0.0002	0.016	< 0.529	< 0.0025	< 0.002
	6/15/2022	4.4	150	120	0.68	7.24	520	1100	< 0.003	0.0045	0.075	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.023	< 0.0002	0.056	1.3	< 0.0025	< 0.002
	8/25/2022	2.9	65	130	0.75	7.90	450	1100	< 0.003	0.0035	0.052	< 0.001	< ^1+ 0.0005	< 0.005	< 0.001	< 0.0005	0.016	< 0.0002	0.073	0.944	< 0.0025	< 0.002
	11/15/2022	3	59	140	1	8.01	440	1000	< 0.003	0.0032	0.044	< ^+ 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.017	< 0.0002	0.087	1.29	< 0.0025	< 0.002
	2/22/2023	3	220	120	0.41	6.68	470	1500	< 0.003	0.0016	0.084	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.027	< 0.0002	0.022	0.714	< 0.0025	< 0.002
	4/27/2023	3.5	190	110	0.55	6.51	610	1600	< 0.0030	0.0021	0.067	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	0.026	< 0.00020	0.043	< 0.566	< 0.0025	< 0.0020
MW-14 down gradient	5/4/2021	4.8	130	110	0.44	8.03	490	1100	< 0.003	0.0035	0.097	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.046	< 0.0002	0.053	< 0.453	< 0.0025	< 0.002
	5/25/2021	5.1	140	110	0.42	7.94	550	1300	< 0.003	0.0038	0.082	^1+ < 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.051	< 0.0002	0.052	0.736	< 0.0025	< 0.002
	6/7/2021	5.7	150	110	0.47	7.53	530	1200	< 0.003	0.0047	0.13	< 0.001	< 0.0005	< 0.005	< 0.001	0.00062	0.05	< 0.0002	0.054	< 0.368	< 0.0025	< 0.002
	6/28/2021	B 3.1	87	120	0.74	8.17	400	990	^+ < 0.003	0.0028	0.086	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.021	< 0.0002	0.081	1.07	< 0.0025	< 0.002
	7/12/2021	5.2	130	92	0.46	7.67	470	1100	< 0.003	0.0061	0.094	^+ < 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.058	< 0.0002	0.049	1.07	< 0.0025	< 0.002
	8/2/2021	4.7	120	88	0.47	7.75	470	1100	< 0.003	0.0064	0.24	< 0.001	< 0.0005	< 0.005	< 0.001	0.0016	0.052	< 0.0002	0.051	1.25	< 0.0025	< 0.002
	8/25/2021	4.1	96	92	0.58	8.21	440	930	< 0.003	0.0047	0.14	< 0.001	< 0.0005	< 0.005	< 0.001	0.00054	0.037	< 0.0002	0.064	1.43	< 0.0025	< 0.002
	11/23/2021	3.0	81	120	0.6	7.90	460	1000	< 0.003	0.0023	0.051	^1+ < 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.02	< 0.0002	0.049	1.21	< 0.0025	< 0.002
	2/23/2022	3.8	110	110	0.58	7.86	440	1100	< 0.003	0.0028	0.12	< ^1+ 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.024	< 0.0002	0.059	0.874	< 0.0025	< 0.002
	6/14/2022	5.3	160	^+ 110	0.47	7.09	490	1200	< 0.003	0.0021	0.083	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.048	< 0.0002	0.05	1.13	< 0.0025	< 0.002
	8/23/2022	4.1	97	97	0.57	7.72	410	1200	< 0.003	0.0022	0.092	< 0.001	< ^1+ 0.0005	< 0.005	< 0.001	< 0.0005	0.03	< 0.0002	0.067	1.45	< 0.0025	< 0.002
	11/17/2022	3.1	83	120	0.85	7.94	570	970	< 0.003	0.0024	0.11	< ^+ 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.021	< 0.0002	0.073	0.817	< 0.0025	< 0.002
	2/21/2023	2.6	88	120	0.61	8.02	390	970	< 0.003	0.0028	0.15	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.021	< 0.0002	0.071	0.961	< 0.0025	< 0.002
	4/25/2023	3.2	100	120	0.56	7.71	480	1000	< 0.0030	0.0028	0.082	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	0.024	< 0.00020	0.064	< 0.536	< 0.0025	< 0.0020
MW-15 down gradient	5/4/2021	3.1	180	140	0.34	7.29	510	1400	< 0.003	0.0015	0.18	< 0.001	< 0.0005	< 0.005	0.0012	< 0.0005	0.025	< 0.0002	0.03	1.16	< 0.0025	< 0.002
	5/25/2021	3.2	220	120	0.37	7.27	600	1400	< 0.003	0.0018	0.14	^1+ < 0.001	< 0.0005	< 0.005	0.0016	< 0.0005	0.025	< 0.0002	0.026	< 0.564	< 0.0025	< 0.002
	6/7/2021	3.8	170	110	0.53	7.12	570	1200	< 0.003	0.0021	0.10	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.019	< 0.0002	0.033	0.491	< 0.0025	< 0.002
	6/25/2021	B 3.4	170	110	0.51	7.09	550	1300	^+ < 0.003	0.003	0.10	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.021	< 0.0002	0.036	0.533	< 0.0025	< 0.002
	7/12/2021	3.3	180	110	0.47	7.01	510	1300	< 0.003	0.0041	0.12	^+ < 0.001	< 0.0005	< 0.005	0.0013	< 0.0005	0.025	< 0.0002	0.028	0.931	< 0.0025	< 0.002
	8/2/2021	3.1	160	98	0.56	7.23	550	1200	< 0.003	0.0039	0.097	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.018	< 0.0002	0.036	1.3	< 0.0025	< 0.002
	8/25/2021	3.2	140	130	0.6	7.73	510	820	< 0.003	0.0028	0.097	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.019	< 0.0002	0.036	1.46	< 0.0025	< 0.002
	11/19/2021	2.9	140	120	0.46	6.91	570	1300	< 0.003	0.0036	0.084	^+ < 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.015	< 0.0002	0.021	1.57	< 0.0025	< 0.002
	2/22/2022	3.3	230	100	0.38	6.73	620	1600	< 0.003	0.003	0.12	< ^1+ 0.001	< 0.0005	< 0.005	0.0012	< 0.0005	0.021	< 0.0002	0.02	1.46	< 0.0025	< 0.002
	6/14/2022	3.7	230	^+ 130	0.45	6.60	750	1500	< 0.003	0.0027	0.10	< 0.001	< 0.0005	< 0.005	0.0012	< 0.0005	0.021	< 0.0002	0.027	0.539	< 0.0025	< 0.002
	8/23/2022	3.5	160	110	0.58	6.90	580	1500	< 0.003	0.0047	0.088	< 0.001	< ^1+ 0.0005	< 0.005	< 0.001	< 0.0005	0.018	< 0.0002	0.03	0.714	< 0.0025	< 0.002
	11/17/2022	4.1	170	120	0.57	7.16	480	1200	< 0.003	0.0038	0.098	< ^+ 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.02	< 0.0002	0.03	0.857	< 0.0025	< 0.002
	2/21/2023	3	290	120	0.28	6.61	690	1700	< 0.003	0.0031	0.15	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.026	< 0.0002	0.015	0.957	< 0.0025	< 0.002
	4/25/2023	3.2	250	120	0.30	6.50	730	1700	< 0.0030	0.0018	0.11	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	0.028	< 0.00020	0.019	< 0.504	< 0.0025	< 0.0020

Notes: All units are in mg/l except pH is in standard units and radium is in pCi/L
B - Compound was found in the blank and sample.
R - Resample
F1 - MS and/or MSD Recovery outside of limits.
F2 - MS/MSD RPD exceeds control limits
^1+ or ^+ - Initial or Continuing Calibration Verification limits is outside acceptable limits, high biased.

Table 9-4. Groundwater Analytical Results-Midwest Generation, LLC, Will County Station, Romeoville, IL. Pond 1S.

Well	Date	Boron	Calcium	Chloride	Fluoride	pH	Sulfate	Total Dissolved Solids	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Lead	Lithium	Mercury	Molybdenum	Radium 226 + 228 Combined	Selenium	Thallium
MW-03 up-gradient	5/3/2021	3.3	140	18	0.31	6.90	240	890	< 0.003	0.0011	0.11	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.04	< 0.0002	0.017	0.993	< 0.0025	< 0.002
	5/24/021	3.2	120	19	0.34	6.91	270	900	< 0.003	0.001	0.001	^1+ < 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.038	< 0.0002	0.018	0.922	0.0057	< 0.002
	6/8/2021	3.7	140	21	0.32	6.75	290	940	< 0.003	0.0014	0.10	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.041	< 0.0002	0.017	0.857	< 0.0025	< 0.002
	6/28/2021	B 3.6	120	23	0.32	7.17	290	930	^+ < 0.003	0.0023	0.091	< 0.001	< 0.0005	< 0.005	0.001	< 0.0005	0.044	< 0.0002	0.022	1.03	< 0.0025	< 0.002
	7/12/2021	3.8	120	27	0.33	6.88	270	870	< 0.003	0.0033	0.10	< 0.001	0.00053	< 0.005	< 0.001	< 0.0005	0.048	< 0.0002	0.028	1.97	< 0.0025	< 0.002
	8/2/2021	6.2	120	31	0.3	6.86	280	920	< 0.003	0.0053	0.096	< 0.001	< 0.0005	< 0.005	0.001	< 0.0005	0.043	< 0.0002	0.021	1.16	< 0.0025	< 0.002
	8/24/2021	3.3	120	F1 F2 50	0.35	7.28	300	890	< 0.003	0.0021	0.091	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.042	< 0.0002	0.022	0.763	< 0.0025	< 0.002
	11/19/2021	3.7	160	27	0.32	6.67	330	970	< 0.003	0.0016	0.12	^1+ < 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.039	< 0.0002	0.025	2.47	0.0082	< 0.002
	2/24/2022	2.6	220	18	0.3	6.53	360	1200	< 0.003	0.0015	0.12	< ^1+ 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.032	< 0.0002	0.014	1.11	0.046	< 0.002
	6/16/2022	4.0	140	18	0.31	6.62	300	910	< 0.003	0.0014	0.10	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.045	< 0.0002	0.022	1.38	< 0.0025	< 0.002
	8/24/2022	3.4	140	35	0.34	6.73	360	1200	< 0.003	< 0.001	0.096	< 0.001	< ^1+ 0.0005	< 0.005	0.001	< 0.0005	0.035	< 0.0002	0.018	1.24	< 0.0025	< 0.002
	11/15/2022	3.5	140	43	F1 0.64	6.79	360	990	< 0.003	0.0039	0.095	< ^+ 0.001	< 0.0005	< 0.005	0.0012	0.00063	0.037	< 0.0002	0.021	1.78	< 0.0025	< 0.002
	2/22/2023	2.4	180	14	0.29	6.83	330	1000	< 0.003	< 0.001	0.099	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.03	< 0.0002	0.013	0.76	0.03	< 0.002
	4/27/2023	3.2	150	16	0.28	6.54	320	1000	< 0.0030	0.0013	0.090	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	0.040	< 0.00020	0.021	1.12	0.0057	< 0.0020
MW-04 up-gradient	5/3/2021	5.1	310	28	0.36	6.76	910	2000	< 0.003	0.003	0.046	< 0.001	< 0.0005	< 0.005	0.0019	< 0.0005	0.026	< 0.0002	0.026	1.16	< 0.0025	< 0.002
	5/24/2021	5.5	340	24	0.38	6.90	950	2000	< 0.003	0.0039	0.047	^1+ < 0.001	< 0.0005	< 0.005	0.0016	< 0.0005	0.027	< 0.0002	0.028	1.72	0.0051	< 0.002
	6/8/2021	5.7	310	24	0.37	6.58	910	2000	< 0.003	0.0026	0.043	< 0.001	< 0.0005	< 0.005	0.0016	< 0.0005	0.027	< 0.0002	0.028	< 0.459	0.0076	< 0.002
	6/28/2021	B 5.6	330	20	0.35	6.95	930	2100	^+ < 0.003	0.011	0.047	< 0.001	< 0.0005	< 0.005	0.0016	< 0.0005	0.025	< 0.0002	0.027	1.12	0.019	< 0.002
	7/12/2021	5.9	320	16	0.38	6.70	970	2100	< 0.003	0.01	0.049	< 0.001	< 0.0005	< 0.005	0.0016	< 0.0005	0.03	< 0.0002	0.033	1.68	0.0056	< 0.002
	8/2/2021	5.3	310	21	0.38	6.71	1000	2200	< 0.003	0.0039	0.046	< 0.001	< 0.0005	< 0.005	0.0018	< 0.0005	0.027	< 0.0002	0.032	1.18	< 0.0025	< 0.002
	8/24/2021	6.2	320	90	0.40	7.09	1100	1700	< 0.003	0.0075	0.046	< 0.001	< 0.0005	< 0.005	0.002	< 0.0005	0.028	< 0.0002	0.035	< 0.642	< 0.0025	< 0.002
	11/19/2021	6.1	300	23	0.36	6.69	840	1900	< 0.003	0.0063	0.044	^1+ < 0.001	< 0.0005	< 0.005	0.0022	< 0.0005	0.022	< 0.0002	0.023	1.17	< 0.0025	< 0.002
	2/24/2022	4.7	350	16	0.37	6.50	950	2100	< 0.003	0.02	0.039	< ^1+ 0.001	< 0.0005	< 0.005	0.0017	< 0.0005	0.02	< 0.0002	0.028	< 0.424	0.09	< 0.002
	6/16/2022	5.5	310	22	0.37	6.55	990	2200	< 0.003	0.003	0.045	< 0.001	< 0.0005	< 0.005	0.0021	< 0.0005	0.023	< 0.0002	0.026	1.39	0.0044	< 0.002
	8/24/2022	5.8	280	18	0.40	6.57	810	2000	< 0.003	0.0053	0.044	< 0.001	< ^1+ 0.0005	< 0.005	0.003	< 0.0005	0.019	< 0.0002	0.021	1.41	0.003	< 0.002
	11/15/2022	5.6	290	19	0.64	6.64	770	1700	< 0.003	0.011	0.047	< ^+ 0.001	< 0.0005	< 0.005	0.0032	< 0.0005	0.02	< 0.0002	0.021	4.15	0.0061	< 0.002
	2/22/2023	3.7	390	36	0.38	6.77	1200	2500	< 0.003	0.0044	0.035	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.02	< 0.0002	0.032	0.795	0.067	< 0.002
	4/27/2023	4.3	310	25	0.33	6.51	870	2000	< 0.0030	0.0027	0.039	< 0.0010	< 0.00050	< 0.0050	0.0015	< 0.00050	0.021	< 0.00020	0.023	1.19	0.0091	< 0.0020
MW-08 down gradient	5/4/2021	2.6	190	290	0.51	6.95	490	1900	< 0.003	0.0073	0.081	< 0.001	< 0.0005	< 0.005	0.0015	< 0.0005	0.015	< 0.0002	0.047	0.873	< 0.0025	< 0.002
	5/25/2021	2.8	170	290	0.51	6.90	540	1600	< 0.003	0.0074	0.083	^1+ < 0.001	< 0.0005	< 0.005	0.001	< 0.0005	0.016	< 0.0002	0.044	1.06	< 0.0025	< 0.002
	6/7/2021	4.2	170	120	0.59	7.24	650	1400	< 0.003	0.01	0.067	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.021	< 0.0002	0.091	0.768	< 0.0025	< 0.002
	6/28/2021	B 3.0	160	190	0.53	7.17	480	1400	^+ < 0.003	0.014	0.083	< 0.001	< 0.0005	< 0.005	< 0.001	0.0011	0.019	< 0.0002	0.066	0.621	< 0.0025	< 0.002
	7/12/2021	7.0	200	260	0.5	6.64	530	1600	< 0.003	0.013	0.17	^+ < 0.001	< 0.0005	< 0.005	0.0012	< 0.0005	0.022	< 0.0002	0.07	0.841	< 0.0025	< 0.002
	8/2/2021	3.1	160	180	0.53	6.87	530	1400	< 0.003	0.012	0.074	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.021	< 0.0002	0.076	0.533	< 0.0025	< 0.002
	8/25/2021	3.0	130	150	0.61	7.45	500	1100	< 0.003	0.011	0.068	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.021	< 0.0002	0.084	0.888	< 0.0025	< 0.002
	11/19/2021	3.3	200	310	0.5	6.66	630	1900	< 0.003	0.0094	0.065	^1+ < 0.001	< 0.0005	< 0.005	0.0014	< 0.0005	0.013	< 0.0002	0.043	1.69	< 0.0025	< 0.002
	2/24/2022	1.6	170	210	0.52	6.84	270	1200	< 0.003	0.006	0.061	< ^1+ 0.001	< 0.0005	< 0.005	< 0.001	0.00068	0.0088	< 0.0002	0.026	< 0.645	0.048	< 0.002
	6/15/2022	2.9	150	170	0.59	6.66	480	1300	< 0.003	0.0048	0.075	< 0.001	< 0.0005	< 0.005	0.0016	< 0.0005	0.014	< 0.0002	0.064	1.39	< 0.0025	< 0.002
	8/25/2022	3.0	120	140	0.75	6.95	480	1200	< 0.003	0.0062	0.059	< 0.001	^1+ 0.0012	< 0.005	< 0.001	< 0.0005	0.019	< 0.0002	0.085	1.23	< 0.0025	< 0.002
	11/17/2022	3.5	110	120	0.63	7.19	500	1100	< 0.003	0.014	0.061	< ^+ 0.001	< 0.0005	< 0.005	0.0016	< 0.0005	0.021	< 0.0002	0.11	1.2	< 0.0025	< 0.002
	2/23/2023	1.9	150	200	0.6	7.03	320	1300	< 0.003	0.003	0.04	< ^1+ ^+ 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.028	0.949	0.033	< 0.002
	4/27/2023	2.7	180	150	0.54	6.82	480	1600	< 0.0030	0.0025	0.052	< 0.0010	< 0.00050	< 0.0050	0.0014	< 0.00050	< 0.010	< 0.00020	0.030	< 0.654	< 0.0025	< 0.0020
MW-09 down gradient	11/11/2015	1.9	56	190	0.55	9.12	460	750	< 0.003	0.0047	0.027	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.14	-0.2208	< 0.0025	< 0.002
	2/17/2016	1.8	47	160	0.55	9.10	250	600	< 0.003	0.0051	0.027	^ < 0.001	< 0.0005	< 0.005	< 0.001	0.00065	< 0.01	< 0.0002	0.089	< 0.373	< 0.0025	< 0.002
	5/24/2016	1.6	48	180	0.51	8.79	240	640	< 0.003	0.0043	0.027	^ < 0.001	< 0.0005	< 0.005	< 0.001	0.00071	< 0.01	< 0.0002	0.079	0.508	< 0.0025	< 0.002
	8/9/2016	2.2	53	140	0.48	8.35	280	750	< 0.003	0.0052	0.031	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.14	0.639	< 0.0025	< 0.002
	10/26/2016	2.2	33	130	0.81	9.16	230	660	< 0.003	0.0069	0.019	< 0.001	< 0.0005	< 0.005	< 0.0010	< 0.0005	< 0.01	< 0.0002	0.11	0.608	< 0.0025	< 0.002
	1/31/2017	2.0	61	250	0.57	8.59	180	710	< 0.003	0.0063	0.038	* < 0.001	< 0.0005	< 0.005	< 0.0010	0.0014	< 0.01	^ < 0.0002	0.09	< 0.45	< 0.0025	< 0.002
	5/9/2017	1.8	66	340	0.38	8.58	250	900	< 0.003	0.0052	0.038	< 0.001	< 0.0005	< 0.005	< 0.0010	0.00054	< 0.01	< 0.0002	0.093	< 0.361	< 0.0025	< 0.002
	6/27/2017	1.9	64	330	0.51	7.76	240	940	< 0.003	0.0046	0.039	< 0.001	< 0.0005	< 0.005	< 0.0010	< 0.0005	< 0.01	< 0.0002	0.091	0.638	< 0.0025	< 0.002
	9/6/2017	1.8	59	310	0.51	8.98	240	890	< 0.003	0.0047	0.038	< 0.001	< 0.0005	< 0.005	< 0.0010	< 0.0005	< 0.01	< 0.0002	0.1	0.454	< 0.0025	< 0.002
	11/14/2017	2.6	160	270	0.51	8.10	290	910	< 0.003	0.0017	0.11	< 0.001	< 0.0005	< 0.005	< 0.0010	< 0.0005	0.018	< 0.0002	0.026	< 0.372	0.0061	< 0.002
	5/1/2018	1.7	49	200	0.52	7.81	430	820	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	7/25/2018 R	NA	NA	NA	NA	NA	320	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	10/2/2018	2.1	49	170	0.55	8.09	270	820	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/29/2019	1.5	48	280	0.29	8.90	150	750	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	12/6/2019	2.0	38	140	0.46	8.65	160	630	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/26/2020	1.3	55	320	0.32	8.66	140	720	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	11/3/2020	2.0	43	240	0.55	8.64	180	750	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/26/2021	1.6	67	360	0.39	8.74	180	900	< 0.003	0.0044	0.054	^1+ < 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.054	0.741	< 0.0025	< 0.002
	8/25/2021	1.9	60	360	0.43	9.06	210	800	< 0.003	0.0065	0.049	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.067	< 0.444	< 0.0025	< 0.002
	11/23/2021	1.1	30	290	0.47	8.73	210	900	< 0.003	0.0046	0.024	^1+ < 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.037	0.789	< 0.0025	< 0.002
	2/22/2022	1.5	49	250	0.40	8.65	160	900	< 0.003	0.007	0.037	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.0065	< 0.0002	0.051	< 0.409	< 0.0025	< 0.002
	6/15/2022	1.9	43	230	0.48	8.35	180	730	< 0.003	0.0071	0.036	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.057	< 0.39	< 0.0025	< 0.002
	8/25/2022	2.1	38	210	0.58	8.68	190	770	< 0.003	0.0089	0.034	< 0.001	< ^1+ 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.065	0.661	< 0.0025	< 0.002
	11/16/2022	2.4	37	200	0.76	8.82	180	750	< 0.003	0.0093	0.037	< ^+ 0.001	< 0.0005	< 0.005	< 0.001	0.00073	< 0.01	< 0.0002	0.068	0.648	< 0.0025	< 0.002
	2/23/2023	1.7	36	190	0.53	9.04	210	720	< 0.003	0.0079	0.029	< ^1+ ^+ 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.063	< 0.672	< 0.0025	< 0.002
	4/26/2023	1.7	38	190	0.48	8.82	200	760	< 0.0030	0.0075	0.029	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	< 0.010	< 0.00020	0.062	< 0.554	< 0.0025	< 0.0020
MW-13 down gradient	5/4/2021	1.7	150	210	0.29	7.54	280	1100	< 0.003	0.0011	0.14	< 0.001	< 0.0005	< 0.005	< 0.001	0.00054	0.013	< 0.0002	0.025	1.02	0.0032	< 0.002
	5/26/2021	1.8	150	220	0.32	7.47	280	1100	< 0.003	0.001	0.13	^1+ < 0.001	< 0.0005	< 0.005	< 0.001	0.00052	< 0.01	< 0.0002	0.016	0.724	0.0025	< 0.002
	6/7/2021	2.2	180	250	0.33	7.19	270	1200	< 0.003	0.0021	0.13	< 0.001	< 0.0005	< 0.005	0.0013	0.0014	< 0.01	< 0.0002	0.018	1.07	0.0027	< 0.002
	6/28/2021	0.68	110	160	0.37	7.56	120	840	^+ < 0.003	< 0.001	0.082	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.016	< 0.0002	0.018	0.461	0.0072	< 0.002
	7/12/2021	1.6	150	240	0.33	7.17	220	1200	< 0.003	0.0015	0.13	^+ < 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.017	< 0.0002	0.014	1.08	0.009	< 0.002
	8/2/2021	1.6	170	240	0.32	7.10	240	1200	< 0.003	0.0019	0.13	< 0.001	< 0.0005	< 0.005	< 0.001	0.00055	< 0.01	< 0.0002	0.013	0.523	0.0061	< 0.002
	8/26/2021	2.0	180	260	0.34	7.49	250	980	< 0.003	0.0051	0.16	< 0.001	< 0.0005	0.0072	0.0035	0.0047	0.012	< 0.0002	0.015	< 0.744	< 0.0025	< 0.002
	11/23/2021	1.8	170	230	0.33	7.03	300	1200	< 0.003	0.0011	0.11	^+ < 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.012	1.49	0.0082	< 0.002
	2/23/2022	0.3	75	95	0.34	7.25	66	590	< 0.003	< 0.001	0.054	< ^1+ 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.0066	< 0.0002	0.0089	< 0.613	0.0054	< 0.002
	6/14/2022	2.1	500	^+ 200	0.37	6.68	210	940	< 0.003	0.046	0.43	< 0.005	0.0022	0.077	0.041	0.063	< 0.05	< 0.0002	0.026	1.59	0.0097	< 0.002
	8/23/2022	1.2	120	180	0.39	6.92	210	1100	< 0.003	0.0012	0.11	< 0.001	< ^1+ 0.0005	< 0.005	< 0.001	0.0014	0.01	< 0.0002	0.013	< 0.954	0.0099	< 0.002
	11/16/2022	1.6	140	160	0.46	7.10	400	920	< 0.003	0.0015	0.1	< ^+ 0.001	< 0.0005	< 0.005	0.0011	0.0013	< 0.01	< 0.0002	0.017	< 1.7	0.0054	< 0.002
	2/21/2023	0.7	110	150	0.32	7.23	120	740	< 0.003	0.0013	0.11	< 0.001	< 0.0005	< 0.005	< 0.001	0.0011	< 0.01	< 0.0002	0.014	< 1	0.011	< 0.002
	4/25/2023	1.1	120	180	0.35	6.96	200	930	< 0.0030	0.0016	0.11	< 0.0010	< 0.00050	< 0.0050	< 0.0010	0.0010	< 0.010	< 0.00020	0.015	< 0.721	0.013	< 0.0020

Notes: All units are in mg/l except pH is in standard units and radium is in pCi/L
B - Compound was found in the blank and sample.
R - Resample

F1 - MS and/or MSD Recovery outside of limits.
F2 - MS/MSD RPD exceeds control limits
^1+ or ^+ - Initial or Continuing Calibration Verification limits is outside acceptable limits, high biased.

Table 9-4. Groundwater Analytical Data, Pond 2S and Pond 3S, Midwest Generation, LLC, Will County Generating Station, Romeoville, IL.

Well	Date	Boron	Calcium	Chloride	Fluoride	pH	Sulfate	Total Dissolved Solids	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Lead	Lithium	Mercury	Molybdenum	Radium 226 + 228 Combined	Selenium	Thallium
MW-05 up-gradient	11/11/2015	6.1	220	110	0.31	7.24	770	1,900	< 0.003	0.0014	0.071	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.013	< 0.0002	0.0750	-0.168	0.031	< 0.002
	2/18/2016	4.4	230	120	0.31	6.99	730	1,600	< 0.003	0.0021	0.058	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.017	< 0.0002	0.079	0.468	0.019	< 0.002
	5/26/2016	3.7	170	110	0.33	6.73	670	1,500	< 0.003	0.0023	0.055	^ < 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.011	< 0.0002	0.077	< 0.402	0.019	< 0.002
	8/10/2016	3.6	67	120	0.72	8.62	480	970	< 0.003	0.0044	0.043	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.010	F1 < 0.0002	0.14	< 0.394	0.0049	< 0.002
	10/26/2016	3.6	44	120	0.70	9.08	410	920	< 0.003	0.0047	0.033	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.12	0.592	< 0.0025	< 0.002
	2/1/2017	4.6	250	48	0.35	6.81	530	1,600	< 0.003	0.0015	0.058	* < 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.016	^ < 0.0002	0.048	< 0.424	0.029	< 0.002
	5/11/2017	4.0	140	85	0.31	7.86	610	1,200	< 0.003	0.0035	0.053	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.093	< 0.388	< 0.0025	< 0.002
	6/27/2017	3.8	83	99	0.53	7.95	500	1,000	< 0.003	0.0037	0.045	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.11	0.412	< 0.0025	< 0.002
	9/8/2017	4.8	89	78	0.52	9.40	490	1,000	< 0.003	0.0038	V 0.069	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.095	0.486	0.0047	< 0.002
	11/16/2017	4.8	180	52	0.45	6.70	650	1,500	< 0.003	0.0028	0.065	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.021	< 0.0002	0.064	< 0.379	0.012	< 0.002
	5/2/2018	3.6	200	32	0.39	7.23	510	1,300	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	10/3/2018	4.9	150	55	0.48	7.07	430	1,200	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/29/2019	4.1	61	91	0.59	9.10	380	870	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	12/6/2019	4.9	170	31	0.41	6.95	440	1,200	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/22/2020	4.5	52	70	0.59	7.39	300	870	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	11/4/2020	5.0	130	29	0.38	7.06	410	1,100	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/24/2021	4.7	120	28	0.53	7.07	430	1,000	< 0.003	0.0011	0.046	^1+ < 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.015	< 0.0002	0.063	< 0.492	0.042	< 0.002
	8/24/2021	4.6	33	45	0.74	9.42	410	580	< 0.003	0.0054	0.028	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.091	1.230	< 0.0025	< 0.002
	11/23/2021	5.5	140	22	0.44	6.80	370	1,100	< 0.003	0.0035	0.066	^1+ < 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.017	< 0.0002	0.066	0.784	0.012	< 0.002
	2/24/2022	4.9	210	25	0.39	6.73	660	1,400	< 0.003	0.0092	0.077	< ^1+ 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.014	< 0.0002	0.059	< 0.415	0.048	< 0.002
	6/16/2022	5.1	120	41	0.34	7.05	510	1,100	< 0.003	0.0037	0.055	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.011	< 0.0002	0.064	< 0.471	0.008	< 0.002
	8/25/2022	6.6	130	20	0.4	6.69	300	940	< 0.003	0.0043	0.072	< 0.001	< ^1+ 0.0005	< 0.005	< 0.001	< 0.0005	0.016	< 0.0002	0.061	< 0.570	0.0056	< 0.002
	11/15/2022	8.9	150	9.8	0.72	6.78	310	930	< 0.003	0.032	0.099	< ^+ 0.001	0.004	0.0083	< 0.001	< 0.0005	0.02	< 0.0002	0.1	< 0.569	0.089	< 0.002
	2/23/2023	6.3	120	26	0.43	6.83	430	1,100	< 0.003	0.0018	0.058	< ^1+ ^+ 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.012	0.00027	0.067	< 0.655	0.021	< 0.002
	4/26/2023	4.9	210	33	0.47	6.73	670	1600	< 0.0030	0.0022	0.040	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	0.013	< 0.0002	0.055	< 0.479	0.039	< 0.0020
MW-06 up-gradient	11/10/2015	3.0	52	100	0.55	8.63	300	660	< 0.003	0.0016	0.048	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.011	< 0.0002	0.0670	-0.383	0.0039	< 0.002
	2/18/2016	2.5	74	150	0.47	8.58	280	650	< 0.003	0.0014	0.068	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.015	< 0.0002	0.0630	0.412	< 0.0025	< 0.002
	5/26/2016	2.7	86	92	0.44	7.79	350	800	< 0.003	0.002	0.068	^ < 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.012	< 0.0002	0.042	< 0.422	< 0.0025	< 0.002
	8/11/2016	3.6	110	58	0.35	7.74	330	840	< 0.003	0.0029	0.086	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.017	< 0.0002	0.038	< 0.339	< 0.0025	< 0.002
	10/26/2016	3.8	86	74	0.40	8.16	220	800	< 0.003	0.003	0.074	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.013	< 0.0002	0.043	< 0.531	< 0.0025	< 0.002
	2/1/2017	3.4	70	83	0.41	7.88	260	700	< 0.003	0.0043	0.068	* < 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.012	^ < 0.0002	0.05	< 0.511	0.0035	< 0.002
	5/11/2017	3.0	75	84	0.28	8.68	330	570	< 0.003	0.002	0.054	< 0.001	< 0.0005	< 0.005	< 0.001	0.00054	0.011	< 0.0002	0.054	< 0.388	< 0.0025	< 0.002
	6/27/2017	3.1	65	74	0.38	8.15	330	710	< 0.003	0.0014	0.069	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.012	< 0.0002	0.046	0.408	< 0.0025	< 0.002
	9/7/2017	3.5	75	67	0.40	8.20	300	740	< 0.003	0.0025	0.077	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.013	< 0.0002	0.044	0.397	< 0.0025	< 0.002
	11/16/2017	3.9	88	54	0.39	7.59	280	810	< 0.003	0.0028	0.077	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.017	< 0.0002	0.038	0.491	0.012	< 0.002
	5/3/2018	3.0	91	52	0.26	6.91	530	750	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	7/25/2018 R	NA	NA	NA	NA	7.47	280	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	10/3/2018	3.5	93	44	0.31	7.83	240	720	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/29/2019	4.3	120	38	0.21	7.51	350	1,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	7/3/2019 R	3.2	NA	NA	NA	8.28	NA	740	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	12/6/2019	4.2	98	31	0.33	7.91	210	740	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/22/2020	3.4	98	56	0.31	7.47	180	710	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	11/3/2020	3.3	100	43	0.36	7.29	170	700	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/24/2021	2.6	99	46	0.33	7.65	160	610	< 0.003	0.0025	0.08	^1+ < 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.016	< 0.0002	0.017	0.576	< 0.0025	< 0.002
	8/24/2021	2.9	100	100	0.35	7.09	170	370	< 0.003	0.0029	0.093	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.021	< 0.0002	0.018	< 0.468	< 0.0025	< 0.002
	11/23/2021	2.6	85	43	0.37	7.48	150	720	< 0.003	0.002	0.07	^1+ < 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.014	< 0.0002	0.017	1.02	< 0.0025	< 0.002
	2/22/2022	2.8	130	35	0.33	7.29	260	940	< 0.003	0.0019	0.09	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.018	< 0.0002	0.033	0.551	0.05	< 0.002
	6/14/2022	2.5	110	22	0.35	7.06	210	610	< 0.003	0.0018	0.082	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.014	< 0.0002	0.018	1.22	< 0.0025	< 0.002
	8/25/2022	2.7	110	20	0.42	7.31	170	750	< 0.003	0.0023	0.088	< 0.001	< ^1+ 0.0005	< 0.005	< 0.001	< 0.0005	0.018	< 0.0002	0.021	< 0.519	< 0.0025	< 0.002
	11/15/2022	3.2	110	19	0.47	7.41	160	600	< 0.003	0.0017	0.083	< ^+ 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.016	< 0.0002	0.021	1.08	< 0.0025	< 0.002
	2/23/2023	3	110	17	0.35	7.54	190	680	< 0.003	0.0023	0.086	< ^1+ ^+ 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.016	< 0.0002	0.023	0.948	0.022	< 0.002
	4/26/2023	2.0	100	15	0.36	7.42	150	610	< 0.0030	0.0023	0.070	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	0.014	< 0.0002	0.019	< 0.422	< 0.0025	< 0.0020
MW-09 down-gradient	11/11/2015	1.9	56	190	0.55	9.12	460	750	< 0.003	0.0047	0.027	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.14	-0.2208	< 0.0025	< 0.002
	2/17/2016	1.8	47	160	0.55	9.10	250	600	< 0.003	0.0051	0.027	^ < 0.001	< 0.0005	< 0.005	< 0.001	0.00065	< 0.01	< 0.0002	0.089	< 0.373	< 0.0025	< 0.002
	5/24/2016	1.6	48	180	0.51	8.79	240	640	< 0.003	0.0043	0.027	^ < 0.001	< 0.0005	< 0.005	< 0.001	0.00071	< 0.01	< 0.0002	0.079	0.508	< 0.0025	< 0.002
	8/9/2016	2.2	53	140	0.48	8.35	280	750	< 0.003	0.0052	0.031	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.14	0.639	< 0.0025	< 0.002
	10/26/2016	2.2	33	130	0.81	9.16	230	660	< 0.003	0.0069	0.019	< 0.001	< 0.0005	< 0.005	< 0.0010	< 0.0005	< 0.01	< 0.0002	0.11	0.608	< 0.0025	< 0.002
	1/31/2017	2.0	61	250	0.57	8.59	180	710	< 0.003	0.0063	0.038	* < 0.001	< 0.0005	< 0.005	< 0.0010	0.0014	< 0.01	^ < 0.0002	0.09	< 0.45	< 0.0025	< 0.002
	5/9/2017	1.8	66	340	0.38	8.58	250	900	< 0.003	0.0052	0.038	< 0.001	< 0.0005	< 0.005	< 0.0010	0.00054	< 0.01	< 0.0002	0.093	< 0.361	< 0.0025	< 0.002
	6/27/2017	1.9	64	330	0.51	7.76	240	940	< 0.003	0.0046	0.039	< 0.001	< 0.0005	< 0.005	< 0.0010	< 0.0005	< 0.01	< 0.0002	0.091	0.638	< 0.0025	< 0.002
	9/6/2017	1.8	59	310	0.51	8.98	240	890	< 0.003	0.0047	0.038	< 0.001	< 0.0005	< 0.005	< 0.0010	< 0.0005	< 0.01	< 0.0002	0.1	0.454	< 0.0025	< 0.002
	11/14/2017	2.6	160	270	0.51	8.1	290	910	< 0.003	0.0017	0.11	< 0.001	< 0.0005	< 0.005	< 0.0010	< 0.0005	0.018	< 0.0002	0.026	< 0.372	0.0061	< 0.002
	5/1/2018	1.7	49	200	0.52	7.81	430	820	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	7/25/2018 R	NA	NA	NA	NA	NA	320	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	10/2/2018	2.1	49	170	0.55	8.09	270	820	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/29/2019	1.5	48	280	0.29	8.90	150	750	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	12/6/2019	2.0	38	140	0.46	8.65	160	630	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/26/2020	1.3	55	320	0.32	8.66	140	720	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	11/3/2020	2.0	43	240	0.55	8.64	180	750	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/26/2021	1.6	67	360	0.39	8.74	180	900	< 0.003	0.0044	0.054	^1+ < 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.054	0.741	< 0.0025	< 0.002
	8/25/2021	1.9	60	360	0.43	9.06	210	800	< 0.003	0.0065	0.049	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.067	< 0.444	< 0.0025	< 0.002
	11/23/2021	1.1	30	290	0.47	8.73	210	900	< 0.003	0.0046	0.024	^1+ < 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.037	0.789	< 0.0025	< 0.002
	2/22/2022	1.5	49	250	0.4	8.65	160	900	< 0.003	0.007	0.037	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.0065	< 0.0002	0.051	< 0.409	< 0.0025	< 0.002
	6/15/2022	1.9	43	230	0.48	8.35	180	730	< 0.003	0.0071	0.036	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.057	< 0.39	< 0.0025	< 0.002
	8/25/2022	2.1	38	210	0.58	8.68	190	770	< 0.003	0.0089	0.034	< 0.001	< ^1+ 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.065	1.22	< 0.0025	< 0.002
	11/16/2022	2.3	37	210	0.79	8.82	160	690	< 0.003	0.0094	0.036	< ^+ 0.001	< 0.0005	< 0.005	< 0.001	0.00066	< 0.01	< 0.0002	0.067	< 0.51	< 0.0025	< 0.002
	2/23/2023	2	38	190	0.53	9.04	210	680	< 0.003	0.0086	0.029	< ^1+ ^+ 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.065	< 0.614	< 0.0025	< 0.002
	4/26/2023	1.8	38	190	0.48	8.82	220	750	< 0.0030	0.0080	0.029	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	< 0.010	< 0.0002	0.062	< 0.562	< 0.0025	< 0.0020

Notes: All units are in mg/l except pH is in standard units and radium is in pCi/L
Italics Date - First round of Detection Monitoring and resample after statistical background establishment.
F1 - MS and/or MSD Recovery outside of limits.
NA - Not analyzed. No confirmation resample required.
R - Resample
V - Serial Dilution exceeds the control limits

^ - Instrument related QC is outside acceptance limits.
* - LCS or LCSD is outside acceptance limits.
^1+ or ^+ - Initial or Continuing Calibration Verification limits is outside acceptable limits, high biased.

Table 9-4. Groundwater Analytical Data, Pond 2S and Pond 3S, Midwest Generation, LLC, Will County Generating Station, Romeoville, IL.

Well	Date	Boron	Calcium	Chloride	Fluoride	pH	Sulfate	Total Dissolved Solids	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Lead	Lithium	Mercury	Molybdenum	Radium 226 + 228 Combined	Selenium	Thallium
MW-10 down-gradient	11/10/2015	3.9	140	140	0.77	7.34	310	980	< 0.003	0.015	0.096	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.018	< 0.0002	0.068	1.341	< 0.0025	< 0.002
	2/16/2016	3.6	150	240	0.79	7.29	290	950	< 0.003	0.014	0.098	^ < 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.021	< 0.0002	0.075	0.952	< 0.0025	< 0.002
	5/25/2016	3.6	120	140	0.83	7.26	260	1,000	< 0.003	0.034	0.096	^ < 0.001	< 0.0005	< 0.005	< 0.001	0.00055	0.016	< 0.0002	0.065	0.51	< 0.0025	< 0.002
	8/10/2016	4.3	150	120	0.78	7.22	230	970	< 0.003	0.017	0.11	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.021	< 0.0002	0.082	0.864	< 0.0025	< 0.002
	10/26/2016	3.0	160	74	0.52	7.30	220	1,000	< 0.003	0.022	0.11	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.021	< 0.0002	0.030	0.458	< 0.0025	< 0.002
	2/2/2017	3.7	180	81	0.54	7.16	160	930	< 0.003	0.05	0.14	* < 0.001	< 0.0005	< 0.005	< 0.001	0.0013	0.02	^ < 0.0002	0.031	< 0.464	< 0.0025	< 0.002
	5/10/2017	3.0	150	100	0.44	7.83	340	860	< 0.003	0.02	0.11	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.015	< 0.0002	0.066	0.882	< 0.0025	< 0.002
	6/27/2017	2.8	130	110	0.67	7.49	250	930	< 0.003	0.0072	0.096	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.017	< 0.0002	0.080	0.953	< 0.0025	< 0.002
	9/7/2017	2.8	120	120	0.77	7.37	290	920	< 0.003	0.0076	0.086	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.014	0.00058	0.096	0.921	< 0.0025	< 0.002
	11/15/2017	4.1	140	120	0.77	7.10	270	1,000	< 0.003	0.015	0.11	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.021	< 0.0002	0.071	0.893	< 0.0025	< 0.002
	5/1/2018	3.2	150	130	0.65	7.31	280	990	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	10/3/2018	2.5	110	140	0.89	7.60	200	860	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/29/2019	2.8	100	140	0.82	7.53	260	860	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	12/5/2019	3.7	120	110	0.93	7.21	190	940	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/27/2020	2.3	100	170	0.90	7.29	280	850	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	11/3/2020	3.7	130	140	0.87	7.02	180	920	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/25/2021	3.0	160	130	0.62	7.16	160	910	< 0.003	0.018	0.18	^1+ < 0.001	< 0.0005	< 0.005	0.0013	0.0054	0.02	< 0.0002	0.036	< 1.14	< 0.0025	< 0.002
	8/26/2021	2.5	110	140	0.82	7.70	250	740	< 0.003	0.009	0.085	< 0.001	< 0.0005	< 0.005	< 0.001	0.00073	0.017	< 0.0002	0.12	1.48	< 0.0025	< 0.002
	11/23/2021	2.7	110	130	0.71	7.07	230	990	< 0.003	0.012	0.091	^1+ < 0.001	< 0.0005	< 0.005	< 0.001	0.0011	0.013	< 0.0002	0.048	2.22	< 0.0025	< 0.002
	2/24/2022	2.6	130	120	0.53	7.02	170	840	< 0.003	0.0072	0.1	< ^1+ 0.001	< 0.0005	< 0.005	0.0012	0.001	0.014	< 0.0002	0.043	0.768	< 0.0025	< 0.002
	6/14/2022	2.9	100	140	0.86	6.99	280	790	< 0.003	0.008	0.081	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.015	< 0.0002	0.12	1.55	< 0.0025	< 0.002
	8/25/2022	2.6	130	140	0.99	7.47	280	910	< 0.003	0.019	0.11	< 0.001	< ^1+ 0.0005	0.0053	0.001	0.0077	0.015	< 0.0002	0.12	1.2	< 0.0025	< 0.002
	9/28/2022 (R)	NA	NA	NA	NA	NA	NA	NA	NA	0.0088	NA	NA	NA	NA	NA	0.00093	NA	NA	NA	NA	NA	NA
	11/16/2022	4.4	130	160	0.94	7.15	220	910	< 0.003	0.015	0.1	< ^+ 0.001	< 0.0005	< 0.005	< 0.001	0.002	0.018	< 0.0002	0.097	2.74	< 0.0025	< 0.002
	2/23/2023	3.7	140	140	0.71	7.11	250	930	< 0.003	0.015	0.12	< ^1+ ^+ 0.001	< 0.0005	< 0.005	< 0.001	0.0008	0.016	< 0.0002	0.073	1.35	< 0.0025	< 0.002
	4/26/2023	2.8	99	150	0.94	7.23	250	900	< 0.0030	0.013	0.079	< 0.0010	< 0.00050	< 0.0050	< 0.0010	0.00067	0.015	< 0.0002	0.12	1.37	< 0.0025	< 0.0020
MW-11 down-gradient	11/10/2015	2.6	120	89	0.61	7.60	180	620	< 0.003	0.007	0.098	< 0.001	< 0.0005	< 0.005	< 0.001	0.00064	< 0.01	< 0.0002	0.0600	0.736	< 0.0025	< 0.002
	2/16/2016	3.0	100	88	0.68	7.47	170	640	< 0.003	0.0059	0.11	^ < 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.012	< 0.0002	0.078	1.14	< 0.0025	< 0.002
	5/25/2016	2.8	82	98	0.75	7.43	170	640	< 0.003	0.0073	0.093	^ < 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.083	0.775	< 0.0025	< 0.002
	8/10/2016	3.1	96	86	0.72	7.57	150	660	< 0.003	0.0072	0.12	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.010	< 0.0002	0.087	0.807	< 0.0025	< 0.002
	10/26/2016	2.5	110	67	0.53	7.82	120	630	< 0.003	0.0082	0.096	< 0.001	< 0.0005	< 0.005	< 0.001	0.00052	< 0.01	< 0.0002	0.043	0.51	< 0.0025	< 0.002
	2/1/2017	3.9	110	72	0.65	7.54	110	600	< 0.003	0.011	0.15	* < 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.076	0.909	< 0.0025	< 0.002
	5/10/2017	3.1	95	84	0.46	8.37	170	590	< 0.003	0.014	0.14	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.074	1.03	< 0.0025	< 0.002
	6/27/2017	2.8	87	90	0.59	7.57	150	680	< 0.003	0.0058	0.11	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.069	0.692	< 0.0025	< 0.002
	9/7/2017	2.8	90	94	0.58	7.40	150	*730*	< 0.003	0.0074	0.11	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.067	0.676	< 0.0025	< 0.002
	11/15/2017	2.9	96	100	0.65	7.41	160	*750*	< 0.003	0.0082	0.15	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.075	1.04	< 0.0025	< 0.002
	5/3/2018	3.8	73	110	0.69	6.74	190	670	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	10/3/2018	3.1	78	110	0.66	7.65	120	680	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/29/2019	2.2	86	110	0.49	7.55	120	610	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	12/5/2019	2.5	100	80	0.55	7.26	91	600	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/26/2020	2.3	89	100	0.54	7.4	90	540	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	11/3/2020	4.3	85	140	0.72	7.17	68	710	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/25/2021	3.8	94	130	0.74	7.68	57	660	< 0.003	0.0067	0.16	^1+< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.077	1.29	< 0.0025	< 0.002
	8/26/2021	1.9	110	150	0.39	7.73	100	710	< 0.003	0.0076	0.1	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.011	< 0.0002	0.034	1.29	< 0.0025	< 0.002
	11/23/2021	2.0	130	150	0.48	6.94	94	810	< 0.003	0.0085	0.11	^1+ < 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.025	2.35	< 0.0025	< 0.002
	12/22/2021 R	NA	NA	150	NA	7.03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	2/23/2022	1.8	130	150	0.38	6.94	91	760	< 0.003	0.013	0.12	< ^1+ 0.001	< 0.0005	< 0.005	< 0.001	0.0006	0.011	< 0.0002	0.031	1.65	< 0.0025	< 0.002
	6/13/2022	2.8	120	140	0.4	7.22	97	700	< 0.003	0.0088	0.17	< 0.001	< 0.0005	< 0.005	0.0022	0.0018	0.011	< 0.0002	0.058	1.44	< 0.0025	< 0.002
	8/23/2022	2.5	110	140	0.53	6.94	160	740	< 0.003	0.0082	0.12	< 0.001	< ^1+ 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.033	2.02	< 0.0025	< 0.002
	11/16/2022	3.8	120	130	0.71	7.34	66	700	< 0.003	0.013	0.14	< ^+ 0.001	< 0.0005	< 0.005	0.0015	0.0014	0.01	< 0.0002	0.052	1.61	< 0.0025	< 0.002
	2/21/2023	2.2	120	130	0.45	7.08	81	710	< 0.003	0.016	0.18	< 0.001	< 0.0005	< 0.005	< 0.001	0.00096	< 0.01	< 0.0002	0.037	1.57	< 0.0025	< 0.002
	4/25/2023	2.8	110	130	0.53	7.14	75	730	< 0.0030	0.015	0.18	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	< 0.010	< 0.0002	0.043	< 0.734	< 0.0025	< 0.0020
MW-12 down-gradient	11/10/2015	2.3	150	160	0.59	7.44	290	1,000	< 0.003	0.0016	0.11	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.012	< 0.0002	0.034	0.8139	< 0.0025	< 0.002
	2/16/2016	1.8	130	140	0.52	7.38	220	850	< 0.003	0.0013	0.084	^ < 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.015	< 0.0002	0.031	< 0.407	< 0.0025	< 0.002
	5/25/2016	1.9	130	150	0.54	7.23	250	890	< 0.003	0.0013	0.12	^ < 0.001	< 0.0005	< 0.005	< 0.001	0.00063	0.014	< 0.0002	0.03	0.41	0.0026	< 0.002
	8/10/2016	2.4	170	140	0.49	7.20	280	1000	< 0.003	0.0017	0.12	< 0.001	< 0.0005	< 0.005	< 0.001	0.0006	0.017	< 0.0002	0.04	< 0.426	0.0077	< 0.002
	10/26/2016	2.6	140	120	0.49	7.44	220	980	< 0.003	0.0016	0.11	< 0.001	< 0.0005	0.025	< 0.001	< 0.0005	0.013	< 0.0002	0.036	< 0.664	< 0.0025	< 0.002
	2/1/2017	2.0	160	120	0.48	7.30	150	900	< 0.003	0.0017	0.11	* < 0.001	< 0.0005	< 0.005	< 0.001	0.00065	0.013	< 0.0002	0.023	0.949	< 0.0025	< 0.002
	5/10/2017	2.3	200	240	0.30	7.65	260	1,300	< 0.003	0.0013	0.13	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.012	< 0.0002	0.029	< 0.464	0.017	< 0.002
	6/27/2017	2.4	180	280	0.44	7.31	260	1,300	< 0.003	0.0014	0.14	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.017	< 0.0002	0.03	0.455	0.0032	< 0.002
	9/6/2017	2.6	190	270	0.49	7.26	260	1,400	< 0.003	0.0017	0.13	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.014	< 0.0002	0.032	< 0.317	0.0043	< 0.002
	11/15/2017	1.7	55	200	0.47	6.90	250	1,200	< 0.003	0.0054	0.034	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	< 0.01	< 0.0002	0.11	0.434	< 0.0025	< 0.002
	5/3/2018	1.8	140	170	0.47	6.60	170	960	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	10/2/2018	F1 2.2	150	160	0.49	7.30	170	1,100	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/29/2019	1.9	140	140	0.42	7.23	190	930	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	12/5/2019	2.1	140	71	0.53	7.02	110	820	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/22/2020	1.9	180	120	0.4	6.95	140	1,100	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	11/3/2020	2.2	160	190	0.52	7.27	160	1,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	5/25/2021	1.8	140	170	0.49	7.37	180	930	< 0.003	0.0017	0.14	^1+ < 0.001	< 0.0005	< 0.005	0.001	< 0.00085	0.014	< 0.0002	0.029	0.529	< 0.0025	< 0.002
	8/26/2021	2.1	170	200	0.47	7.49	170	1000	< 0.003	0.002	0.14	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.017	< 0.0002	0.027	1.03	< 0.0025	< 0.002
	11/23/2021	2.3	180	210	0.44	7.01	180	1200	< 0.003	0.002	0.15	^1+ < 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.014	< 0.0002	0.022	0.58	0.0055	< 0.002
	2/24/2022	1.7	150	150	0.4	7.06	150	1000	< 0.003	0.0025	0.27	< ^1+ 0.001	< 0.0005	< 0.005	0.0011	0.0016	0.018	< 0.0002	0.024	< 1.62	0.0061	< 0.002
	6/13/2022	1.9	160	^+ 210	0.45	7.03	170	1000	< 0.003	0.0015	0.15	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.012	< 0.0002	0.024	0.957	0.0045	< 0.002
	8/23/2022	1.9	150	170	0.37	6.62	160	1000	< 0.003	0.0011	0.18	< 0.001	< ^1+ 0.0005	< 0.005	< 0.001	< 0.0005	0.013	< 0.0002	0.015	0.709	0.0086	< 0.002
	11/16/2022	2.3	160	180	0.97	7.34	180	1000	< 0.003	0.0017	0.14	< ^+ 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.015	< 0.0002	0.029	< 0.139	< 0.0025	< 0.002
	2/21/2023	1.6	150	150	0.41	7.15	180	980	< 0.003	0.0015	0.13	< 0.001	< 0.0005	< 0.005	< 0.001	< 0.0005	0.012	< 0.0002	0.025	< 0.651	< 0.0025	< 0.002
	4/25/2023	1.8	150	170	0.42	6.91	180	980	< 0.0030	0.0017	0.12	< 0.0010	< 0.00050	< 0.0050	< 0.0010	< 0.00050	0.012	< 0.0002	0.022	< 0.510	0.0044	< 0.0020

Notes: All units are in mg/l except pH is in standard units and radium is in pCi/L
Italics Date - First round of Detection Monitoring and resample after statistical background establishment.
F1 - MS and/or MSD Recovery outside of limits.
NA - Not analyzed. No confirmation resample required.
R - Resample
V - Serial Dilution exceeds the control limits

^ - Instrument related QC is outside acceptance limits.
* - LCS or LCSD is outside acceptance limits.
^1+ or ^+ - Initial or Continuing Calibration Verification limits is outside acceptable limits, high biased.

Table 9-5. Groundwater Turbidity - Ponds 1N and 1S, Midwest Generation, LLC, Will County Generating Station, Romeoville, IL.

Well ID	Date	Turbidity (NTU)
MW-01 (up-gradient 1N)	2/23/2021	0.64
	4/10/2021	5.81
	4/25/2021	7.69
	5/3/2021	1.74
	5/24/2021	1.83
	6/7/2021	2.32
	6/25/2021	3.50
	7/12/2021	4.18
	8/2/2021	2.87
	8/23/2021	1.17
	9/24/2021	3.25
	11/19/2021	16.82
MW-02 (up-gradient 1N)	2/25/2021	8.84
	4/10/2021	9.17
	4/25/2021	12.03
	5/3/2021	2.42
	5/24/2021	2.7
	6/7/2021	1.82
	6/28/2021	3.15
	7/12/2021	4.23
	8/2/2021	3.11
	8/23/2021	1.37
	9/24/2021	4.63
	11/19/2021	2.10
MW-03 (up-gradient 1S)	3/1/2021	0.0
	4/10/2021	1.45
	4/25/2021	3.41
	5/3/2021	1.61
	5/24/2021	2.06
	6/8/2021	2.34
	6/28/2021	2.69
	7/12/2021	4.07
	8/2/2021	1.98
	8/24/2021	5.1
	9/24/2021	4.18
	11/19/2021	0.47
MW-04 (up-gradient 1S)	2/22/2021	9.87
	4/10/2021	42.2
	4/25/2021	7.41
	5/3/2021	4.2
	5/24/2021	4.45
	6/8/2021	2.8
	6/28/2021	12.93
	7/12/2021	3.93
	8/2/2021	3.75
	8/24/2021	10.1
	9/24/2021	5.74
	11/19/2021	15.15
MW-07 (downgradient 1N)	3/1/2021	6.11
	4/10/2021	6.19
	4/25/2021	6.98
	5/4/2021	37.65
	5/24/2021	2.54
	6/7/2021	6.21
	6/25/2021	6.02
	7/12/2021	5.13
	8/2/2021	2.45
	8/25/2021	7.7
	9/24/2021	4.13
	11/19/2021	7.35

Table 9-5 (cont.). Groundwater Turbidity - Ponds 1N and 1S, Midwest Generation, LLC, Will County Generating Station, Romeoville, IL.

Well ID	Date	Turbidity (NTU)
MW-08 (downgradient 1S)	3/1/2021	2.3
	4/10/2021	270.98
	4/25/2021	26.73
	5/4/2021	6.6
	5/28/2021	6.51
	6/7/2021	4.58
	6/28/2021	5.67
	7/12/2021	6.71
	8/2/2021	14.15
	8/25/2021	8.9
	9/24/2021	7.21
	11/19/2021	2.34
MW-09 (downgradient 1S)	3/1/2021	0.86
	4/10/2021	6.91
	4/25/2021	2.08
	5/25/2021	14.12
	6/11/2021	2.39
	6/29/2021	2.97
	7/12/2021	3.94
	8/4/2021	0.0
	8/25/2021	19.9
	9/24/2021	3.67
	11/23/2021	19.07
MW-13 (downgradient 1S)	5/4/2021	20.6
	5/25/2021	9.8
	6/7/2021	6.49
	6/28/2021	8.25
	7/12/2021	5.89
	8/2/2021	2.91
	8/26/2021	12.9
	9/24/2021	9.13
	11/23/2021	17.83
MW-14 (downgradient 1N)	5/4/2021	6.88
	5/25/2021	3.5
	6/7/2021	2.55
	6/28/2021	7.44
	7/12/2021	4.89
	8/2/2021	9.8
	8/25/2021	11.7
	9/24/2021	6.87
	11/19/2021	5.19
MW-15 (downgradient 1N)	5/4/2021	28.65
	5/25/2021	8.89
	6/7/2021	8.82
	6/28/2021	6.48
	7/12/2021	8.52
	8/2/2021	22.71
	8/25/2021	12.4
	9/24/2021	11.44
	11/19/2021	10.83

Table 9-5. Groundwater Turbidity - Midwest Generation, LLC, Will County Generating Station, Romeoville, IL.

Well ID	Date	Turbidity (NTU)
MW-05	2/23/2021	0.63
	4/10/2021	1.28
	4/25/2021	2.41
	5/24/2021	3.78
	6/11/2021	2.4
	6/28/2021	2.89
	7/12/2021	3.93
	8/4/2021	1.35
	8/24/2021	3.5
	9/24/2021	3.59
MW-06	2/23/2021	0.31
	4/10/2021	11.17
	4/25/2021	15.04
	5/24/2021	5.18
	6/11/2021	2.96
	6/29/2021	4.06
	7/12/2021	6.43
	8/4/2021	3.5
	8/24/2021	7
	9/24/2021	4.2
MW-09	3/1/2021	0.86
	4/10/2021	6.91
	4/25/2021	2.08
	5/25/2021	14.12
	6/11/2021	2.39
	6/29/2021	2.97
	7/12/2021	3.94
	8/4/2021	0
	9/24/2021	3.67
MW-10	2/25/2021	172.14
	4/10/2021	29.99
	4/25/2021	34.77
	5/25/2021	44.14
	6/11/2021	92.03
	6/29/2021	29.35
	7/12/2021	23.45
	8/4/2021	47.68
	8/26/2021	27.5
	9/24/2021	542
MW-11	4/10/2021	269.25
	4/25/2021	60.28
	5/25/2021	9.56
	6/11/2021	77.09
	6/29/2021	7.43
	7/12/2021	39.12
	8/4/2021	9.53
	8/26/2021	11.4
	9/24/2021	9.68
MW-12	4/10/2021	31.67
	4/25/2021	15.04
	5/25/2021	28.65
	6/11/2021	6.1
	6/29/2021	13.04
	7/12/2021	12.99
	8/4/2021	11.97
	8/26/2021	10.9
	9/24/2021	11.97

Table 9-6. Summary of Sample Bottles, Preservation Holding Time, and Analytical Methods. Midwest Generation, LLC, Powertton Generating Station MCB, Pekin, IL.

PARAMETER	ANALYTICAL METHOD	CONTAINER	PRESERVATION	HOLD TIME	METHOD DETECTION LIMIT (MG/L)	Section 845.600(a) Standards
Boron	6020 A	250 mL plastic	HNO_3, < 6 °C	6 months	0.0245	2
Calcium	6020 A	250 mL plastic	HNO_3, < 6 °C	6 months	0.106	NS
Chloride	SM4500 Cl-E	1 L plastic	None, < 6 °C	28 days	1.22	200
Fluoride	SM4500 F-C	1 L plastic	None, < 6 °C	28 days	0.019	4
pH	SM4500 H^+ -B	1 L plastic	None, < 6 °C	immediate *	Field Parameter	6.5 - 9.0 (secondary standard)
Sulfate	SM4500 SO_4 -E	1 L plastic	None, < 6 °C	28 days	2	400
Total Dissolved Solids	SM2400 C	1 L plastic	None, < 6 °C	7 days	6.1	1200
Antimony	6020 A	250 mL plastic	HNO_3, < 6 °C	6 months	0.00101	0.006
Arsenic	6020 A	250 mL plastic	HNO_3, < 6 °C	6 months	0.000439	0.01
Barium	6020 A	250 mL plastic	HNO_3, < 6 °C	6 months	0.000841	2
Beryllium	6020 A	250 mL plastic	HNO_3, < 6 °C	6 months	0.000237	0.004
Cadmium	6020 A	250 mL plastic	HNO_3, < 6 °C	6 months	0.00019	0.005
Chromium	6020 A	250 mL plastic	HNO_3, < 6 °C	6 months	0.000608	0.1
Cobalt	6020 A	250 mL plastic	HNO_3, < 6 °C	6 months	0.000189	0.006
Lead	6020 A	250 mL plastic	HNO_3, < 6 °C	6 months	0.000141	0.0075
Lithium	6010 C	250 mL plastic	HNO_3, < 6 °C	6 months	0.00215	0.04
Mercury	7470 A	250 mL plastic	HNO_3, < 6 °C	28 days	0.0000611	0.002
Molybdenum	6020 A	250 mL plastic	HNO_3, < 6 °C	6 months	0.00162	0.1
Selenium	6020 A	250 mL plastic	HNO_3, < 6 °C	6 months	0.000834	0.05
Thallium	6020 A	250 mL plastic	HNO_3, < 6 °C	6 months	0.000591	0.002
Radium 226	903.0	1 L plastic	HNO_3	180 days	1 pCi/L	5 pCi/L **
Radium 228	904.0	2 L plastic	HNO_3	180 days	1 pCi/L	5 pCi/L **

Notes: It is noted that some parameters may be combined with others within the same container.
* - The result for pH is obtained in the field and is not submitted to the laboratory.
** - Combined Radium 226/228
mL - milliliters
L - liters
°C - degrees Celsius
HNO_3 - Nitric Acid
NS- No Standard

Table 9-7. Proposed Site-Specific Groundwater Protection Standards - Will County Station Pond 1N.

Upgradient Well(s)	Parameter	Section 845.600 Standards	Interwell Background Prediction Limit	**Proposed GWPS**
Well MW-01/MW-02 Pooled	Antimony	0.006	0.003	**0.006**
Well MW-01	Arsenic	0.01	0.001	**0.01**
Well MW-01	Barium	2.0	0.109	**2.0**
Wells MW-01/MW-02 Pooled	Beryllium	0.004	0.001	**0.004**
Well MW-02	Boron	2.0	6.50	**6.50**
Wells MW-01/MW-02 Pooled	Cadmium	0.005	0.0005	**0.005**
Well MW-02	Chloride	200	32.6	**200**
Wells MW-01/MW-02 Pooled	Chromium	0.1	0.0057	**0.1**
Wells MW-01/MW-02 Pooled	Cobalt	0.006	0.001	**0.006**
Well MW-02	Combined Radium 226 + 228 (pCi/L)	5.0	2.036	**5.0**
Well MW-01	Fluoride	4.0	0.708	**4.0**
Wells MW-01/MW-02 Pooled	Lead	0.0075	0.0005	**0.0075**
Well MW-02	Lithium	0.04	0.056	**0.056**
Wells MW-01/MW-02 Pooled	Mercury	0.002	0.0002	**0.002**
Well MW-02	Molybdenum	0.10	0.087	**0.10**
Well MW-01	pH (standard units)	6.5-9.0	6.1 - 7.3	**6.1-9.0**
Well MW-01	Selenium	0.05	0.024	**0.050**
Well MW-01	Sulfate	400	547.6	**547.6**
Wells MW-01/MW-02 Pooled	Thallium	0.002	0.002	**0.002**
Well MW-02	Total Dissolved Solids	1200	1499	**1499**
Well MW-02	Calcium	NE	109.5	**109.5**
Wells MW-01/MW-02 Pooled	Turbidity (NTU)	NE	16.22	**16.22**

All values are in mg/L (ppm) unless otherwise noted.
NE - Not Established
Bold - Proposed Site-specific Groundwater Protection Standard based on Section 845.600(a)(2)

Table 9-8. Proposed Site-Specific Groundwater Protection Standards - Will County Station Pond 1S.

Upgradient Well(s)	Parameter	Section 845.600 Standards	Interwell Background Prediction Limit	**Proposed GWPS**
Wells MW-03/MW-04 Pooled	Antimony	0.006	0.003	**0.006**
Well MW-04	Arsenic	0.01	0.017	**0.017**
Well MW-03	Barium	2.0	0.138	**2.0**
Wells MW-03/MW-04 Pooled	Beryllium	0.004	0.001	**0.004**
Well MW-04	Boron	2.0	6.97	**6.97**
Wells MW-03/MW-04 Pooled	Cadmium	0.005	0.0005	**0.005**
Wells MW-03/MW-04 Pooled	Chloride	200	90.0	**200**
Wells MW-03/MW-04 Pooled	Chromium	0.1	0.005	**0.1**
Well MW-04	Cobalt	0.006	0.003	**0.006**
Wells MW-03/MW-04 Pooled	Combined Radium 226 + 228 (pCi/L)	5.0	2.742	**5.0**
Well MW-04	Fluoride	4.0	0.427	**4.0**
Wells MW-03/MW-04 Pooled	Lead	0.0075	0.0005	**0.0075**
Well MW-03	Lithium	0.04	0.053	**0.053**
Wells MW-03/MW-04 Pooled	Mercury	0.002	0.0002	**0.002**
Well MW-04	Molybdenum	0.10	0.043	**0.10**
Wells MW-03/MW-04 Pooled	pH (standard units)	6.5-9.0	6.36-7.37	**6.36-9.0**
Wells MW-03/MW-04 Pooled	Selenium	0.05	0.019	**0.050**
Well MW-04	Sulfate	400	1217.0	**1217.0**
Wells MW-03/MW-04 Pooled	Thallium	0.002	0.002	**0.002**
Well MW-04	Total Dissolved Solids	1200	2524	**2524**
Well MW-04	Calcium	NE	362.0	**362.0**
Well MW-04	Turbidity (NTU)	NE	66.09	**66.09**

All values are in mg/L (ppm) unless otherwise noted.
NE - Not Established
Bold - Proposed Site-specific Groundwater Protection Standard based on Section 845.600(a)(2)

Table 9-9. Proposed Site-Specific Groundwater Protection Standards - Will County Station Ponds 2S/3S.

Upgradient Well(s)	Parameter	Section 845.600 Standards	Interwell Background Prediction Limit	**Proposed GWPS**
MW-05 and MW-06	Antimony	0.006	0.003	**0.006**
MW-05 and MW-06	Arsenic	0.01	0.005	**0.01**
MW-06*	Barium*	2.0	0.109	**2.0**
MW-05 and MW-06	Beryllium	0.004	0.001	**0.004**
MW-06*	Boron*	2.0	4.739	**4.739**
MW-05 and MW-06	Cadmium	0.005	0.0005	**0.005**
MW-05 and MW-06*	Chloride*	200	166	**200**
MW-05 and MW-06	Chromium	0.1	0.0005	**0.1**
MW-05 and MW-06	Cobalt	0.006	0.001	**0.006**
MW-05 and MW-06	Combined Radium 226 + 228 (pCi/L)	5.0	0.601	**5.0**
MW-05	Fluoride	4.0	0.820	**4.0**
MW-05 and MW-06	Lead	0.0075	0.0005	**0.0075**
MW-05 and MW-06	Lithium	0.04	0.020	**0.04**
MW-05 and MW-06	Mercury	0.002	0.0002	**0.002**
MW-05	Molybdenum	0.10	0.172	**0.172**
MW-05	pH (standard units)	6.5-9.0	6.7-9.4	**6.5-9.4**
MW-05	Selenium	0.05	0.056	**0.056**
MW-05*	Sulfate*	400	1053	**1053**
MW-05 and MW-06	Thallium	0.002	0.002	**0.002**
MW-06*	Total Dissolved Solids*	1200	988	**1200**
MW-05	Calcium	NE	313.4	**313.4**
MW-05	Turbidity (NTU)	NE	6.33	**6.33**

All values are in mg/L (ppm) unless otherwise noted.
* - Limited to original 8 background samples.
NE - Not Established
Bold - Proposed Site-specific Groundwater Protection Standard based on Section 845.600(a)(2)

CONSTRUCTION PERMIT FIGURES

Pond 1N

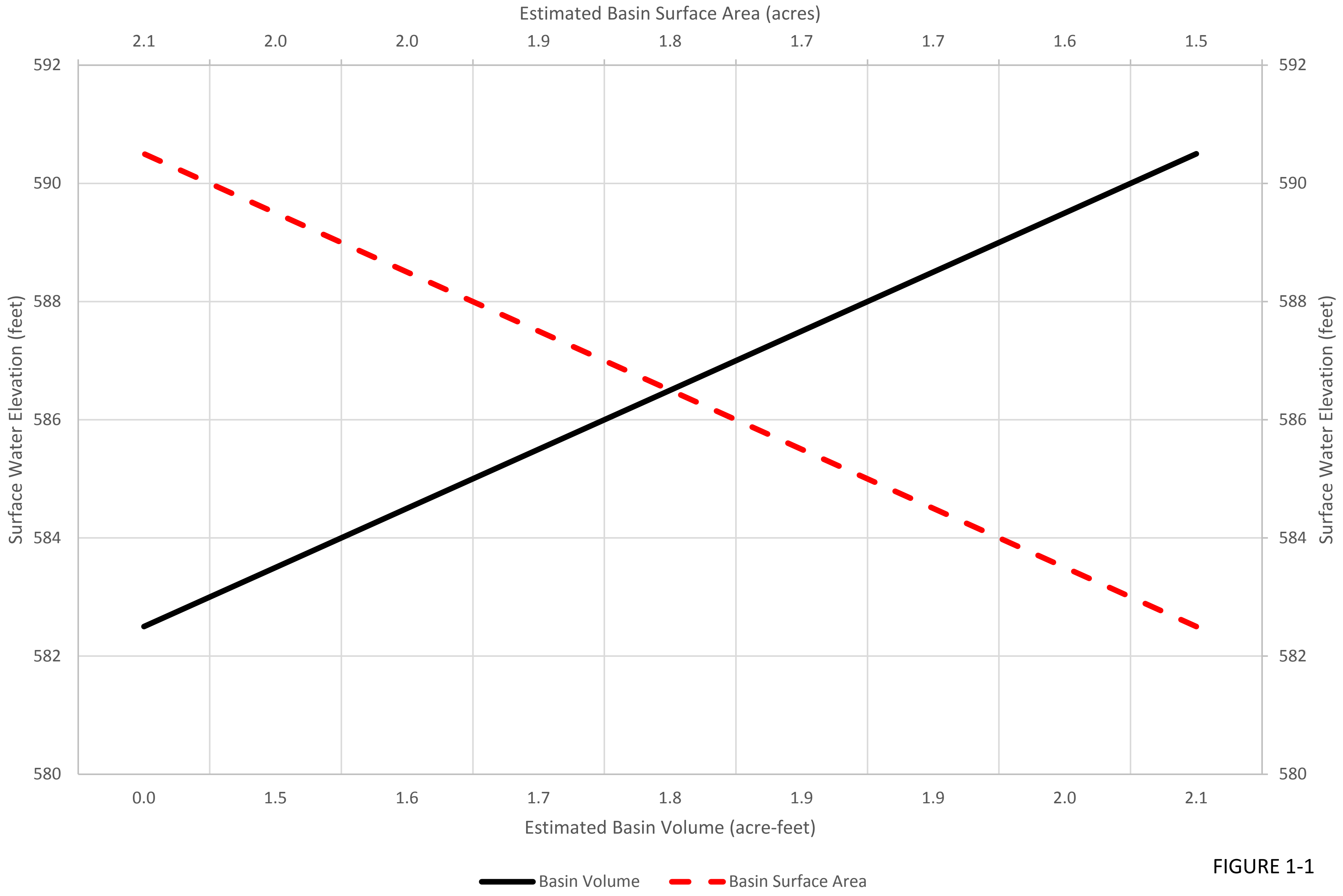


FIGURE 1-1

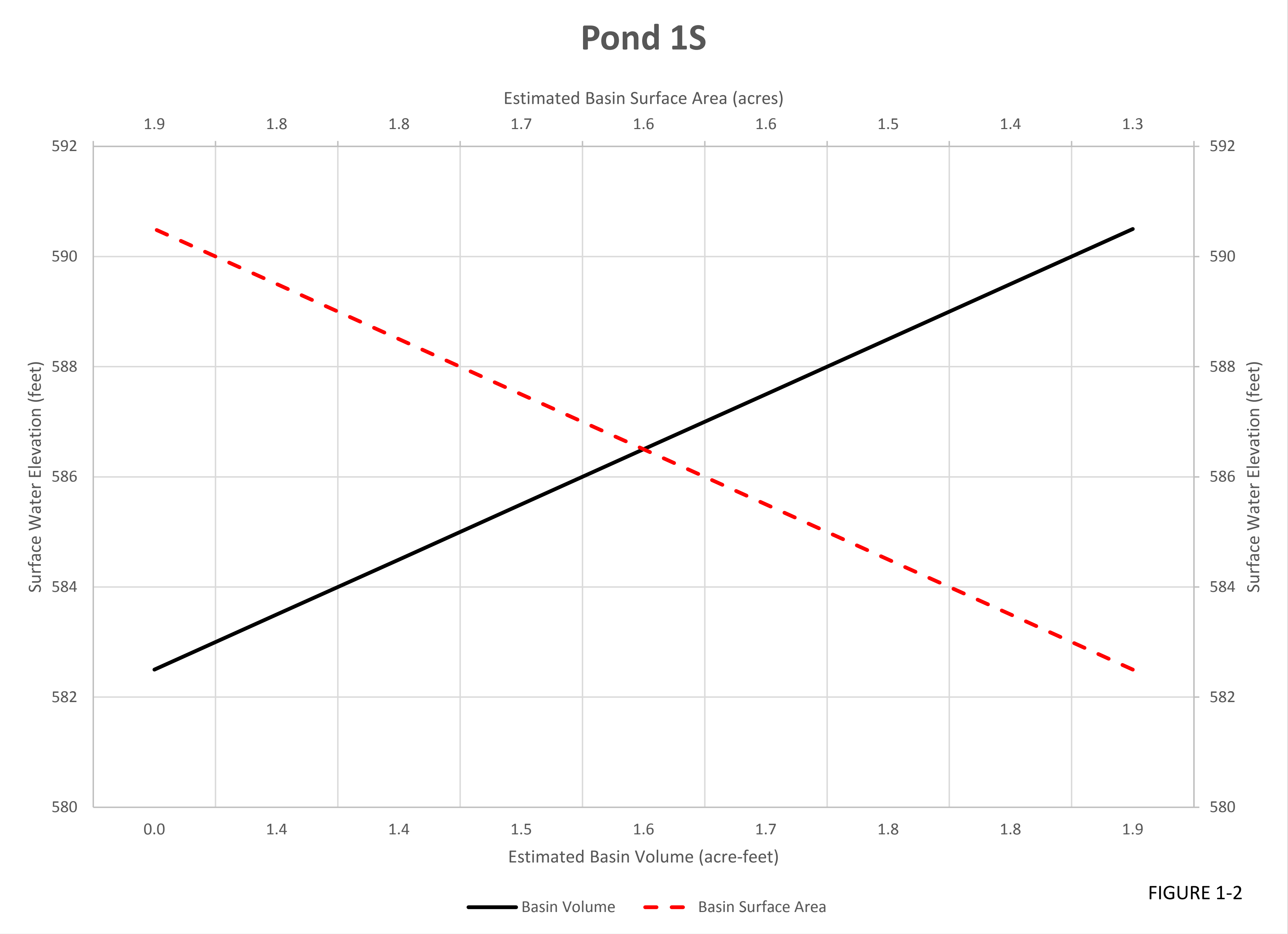
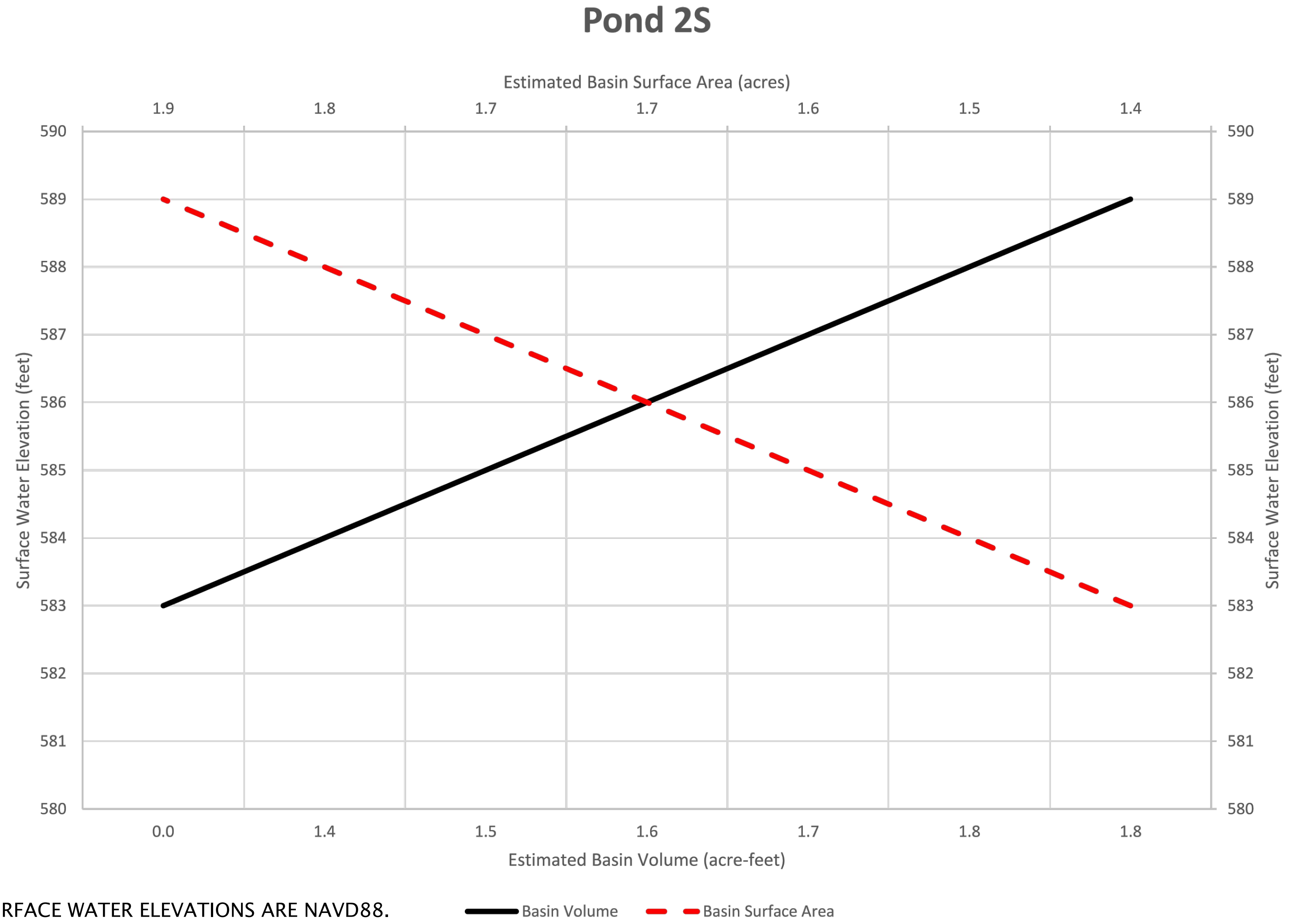

Pond 1S
Estimated Basin Surface Area (acres)
1.9
1.8
1.8
1.7
1.6
1.6
1.5
1.4
1.3
592
590
588
586
584
582
580
Surface Water Elevation (feet)
Surface Water Elevation (feet)
0.0
1.4
1.4
1.5
1.6
1.7
1.8
1.8
1.9
Estimated Basin Volume (acre-feet)
Basin Volume
Basin Surface Area

FIGURE 1-2



NOTES:

1. SURFACE WATER ELEVATIONS ARE NAVD88.
2. BASIN VOLUMES ARE ESTIMATED BASED ON AS-BUILT INFORMATION AND 2008 SITE TOPOGRAPHY.
3. AREA-CAPACITY CURVE CREATED BY KPRG AND ASSOCIATES, INC. AS PART OF COMPLETING THE OPERATING PERMIT N ACCORDANCE WITH TITLE 35 PART 845.

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414 Plaza Drive, Suite 106 Westmont, Illinois 60559 Telephone 630-325-1300 Facsimile 630-325-1593

POND 2S AREA-CAPACITY CURVE

WILL COUNTY STATION
ROMEOVILLE, ILLINOIS

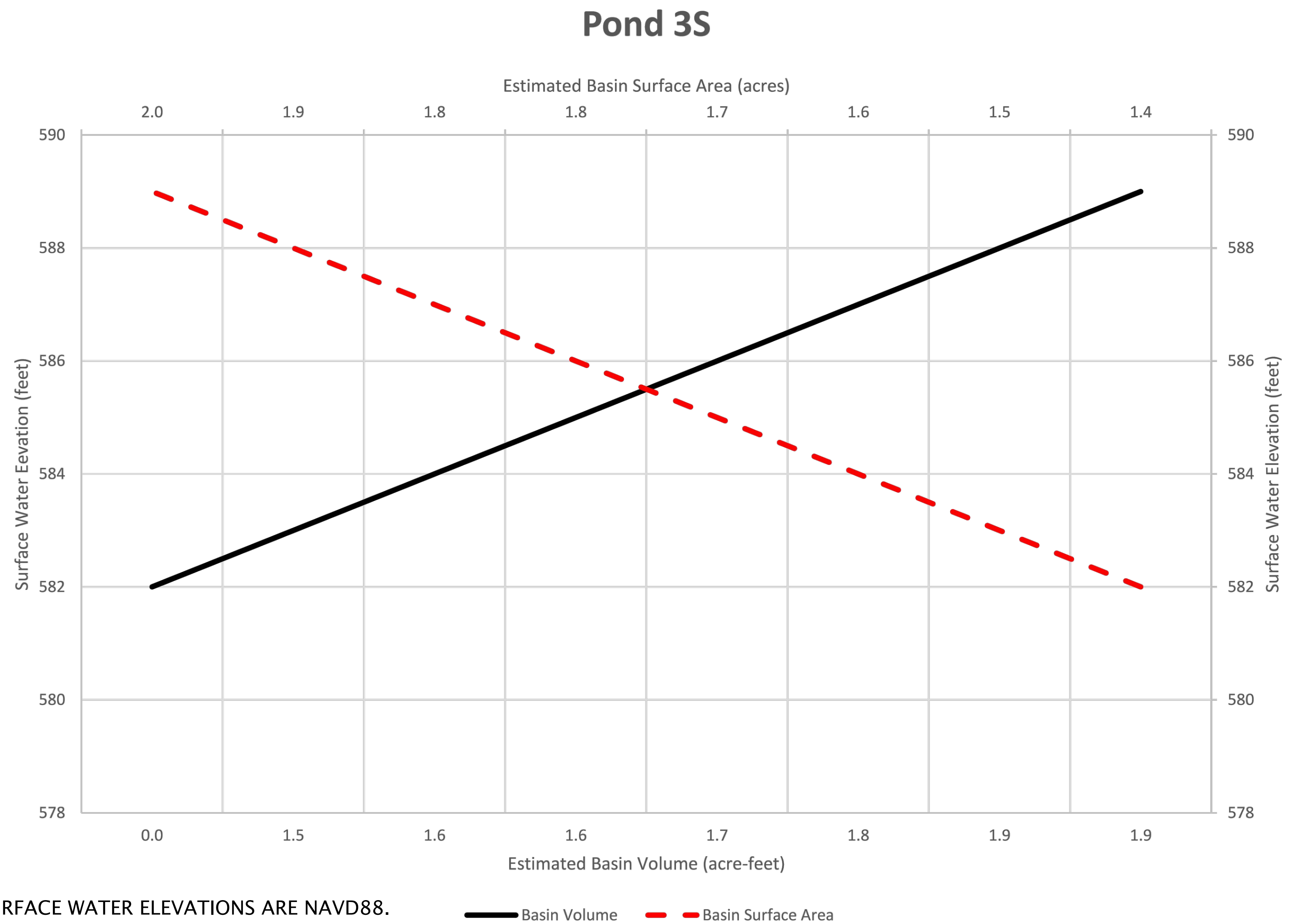
Scale: NTS

Date: October 14, 2021

KPRG Project No. 19520.3

FIGURE 1-3

W:\projects\midwest generation\operating-constructing permits\joliet 29\area-capacity curve.dwg



NOTES:

1. SURFACE WATER ELEVATIONS ARE NAVD88.
2. BASIN VOLUMES ARE ESTIMATED BASED ON AS-BUILT INFORMATION AND 2008 SITE TOPOGRAPHY.
3. AREA-CAPACITY CURVE CREATED BY KPRG AND ASSOCIATES, INC. AS PART OF COMPLETING THE OPERATING PERMIT N ACCORDANCE WITH TITLE 35 PART 845.

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POND 3S AREA-CAPACITY CURVE

WILL COUNTY STATION
ROMEOVILLE, ILLINOIS

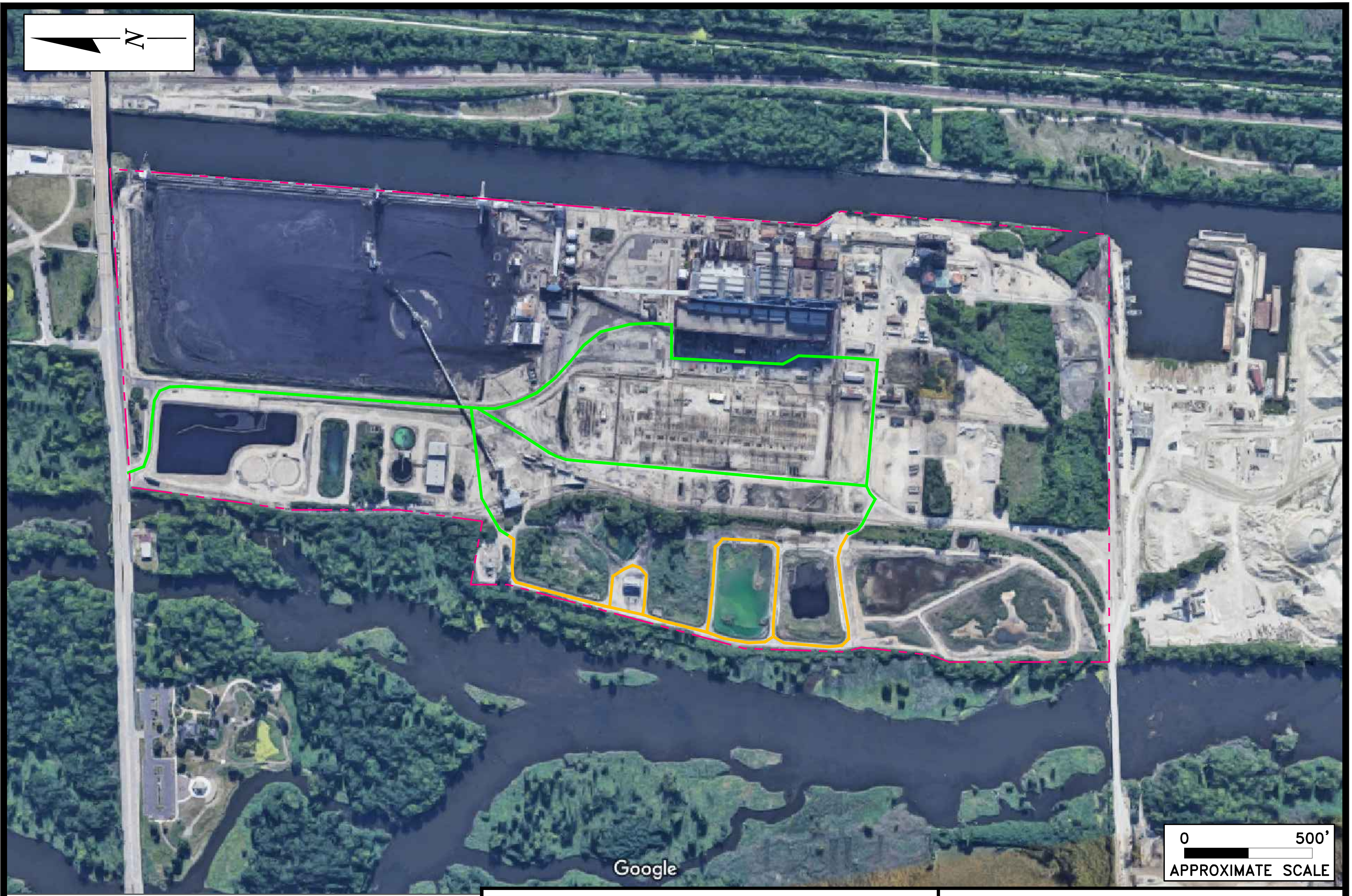
Scale: NTS

Date: October 14, 2021

KPRG Project No. 19520.3

FIGURE 1-4

W:\projects\midwest generation\operating-constructing permits\joliet 29\area-capacity curve.dwg



LEGEND

- ‐·‐·‐ FACILITY BOUNDARY
- 🟩 VEHICLE ACCESS ROADS ON STATION PROPERTY
- 🟧 VEHICLE ACCESS ROADS AROUND PONDS

ENVIRONMENTAL CONSULTATION & REMEDIATION

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KPRG and Associates, inc.

14665 West Lisbon Road, Suite 1A Brookfield, Wisconsin 53005 Telephone 262-781-0475 Facsimile 262-781-0478

414 Plaza Drive, Suite 106 Westmont, Illinois 60559 Telephone 630-325-1300 Facsimile 630-325-1593

SITE TRANSPORTATION MAP

WAUKEGAN GENERATING STATION
WAUKEGAN, ILLINOIS

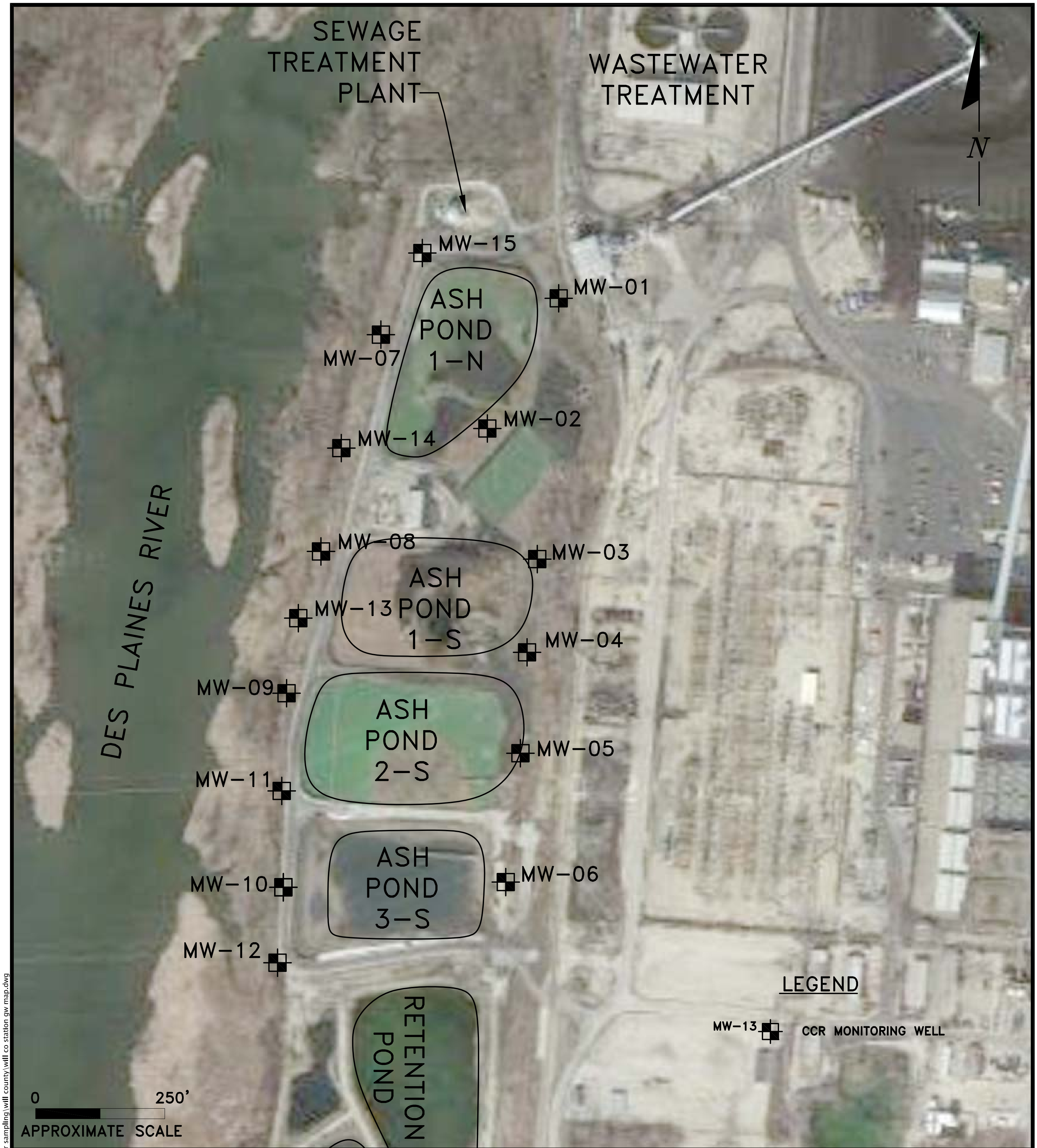
Scale: 1" = 500'

Date: July 28, 2023

KPRG Project No. 19620.3

FIGURE 2

W:\projects\midwest gen\operating and construct permits\will county\figures\will county station const permit.dwg



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CCR MONITORING WELL LOCATIONS

WILL COUNTY STATION
ROMEOVILLE, ILLINOIS

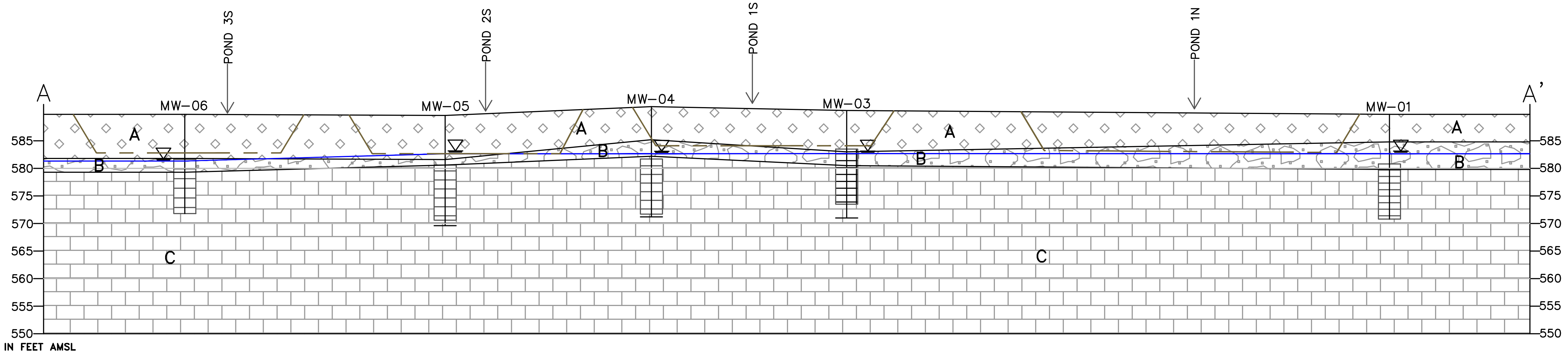
Scale: 1" = 250'

Date: January 18, 2022

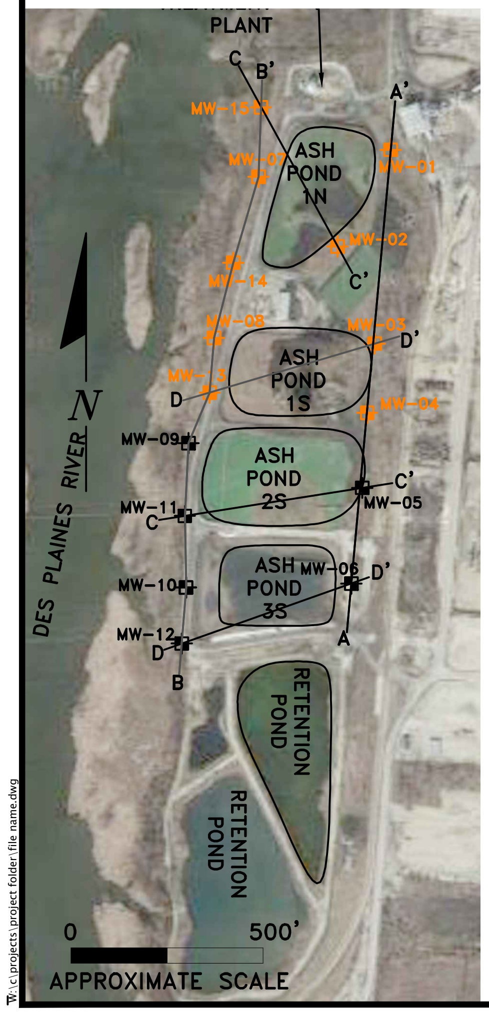
KPRG Project No. 12313.3

FIGURE 9-1

W:\c-p&p\projects\midwest generation\groundwater sampling\will county\will co station gw map.dwg



A	FILL: CONSISTING OF BROWN AND BLACK SILTY CLAY AND SILTY SAND MIXED WITH GRAVEL AND CRUSHED LIMESTONE. THE FILL MAY INCLUDE COAL, BLACK CINDERS AND SLAG.
B	SILTY SAND, SILT AND CLAY: CONSISTING OF GRAVELLY TAN TO BROWN SILTY SAND FINING DOWNWARD TO GRAY/GREENISH MOTTLED SILTY CLAYS AND CLAY.
C	BEDROCK: DOLIMTE BEDROCK. TOP OF WEATHERED BEDROCK IS GENERALLY ENCOUNTERED BETWEEN 9 FEET AND GREATER THAN 20 FEET BELOW GROUND SURFACE WITH DEPTH INCREASING TOWARDS THE SOUTHWEST. IT IS NOTED THAT AT MONITORING WELL LOCATION MW-12, TOP OF BEDROCK WAS NOT ENCOUNTERED AT THE TERMINUS OF THE BORING AT 20 FEET BELOW GROUND SURFACE.
▽	WATER LEVEL (5/21)
—— — ——	PROJECTED POND OUTLINE



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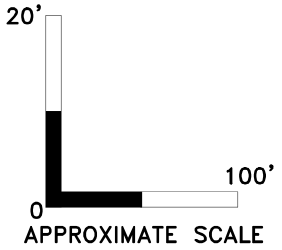

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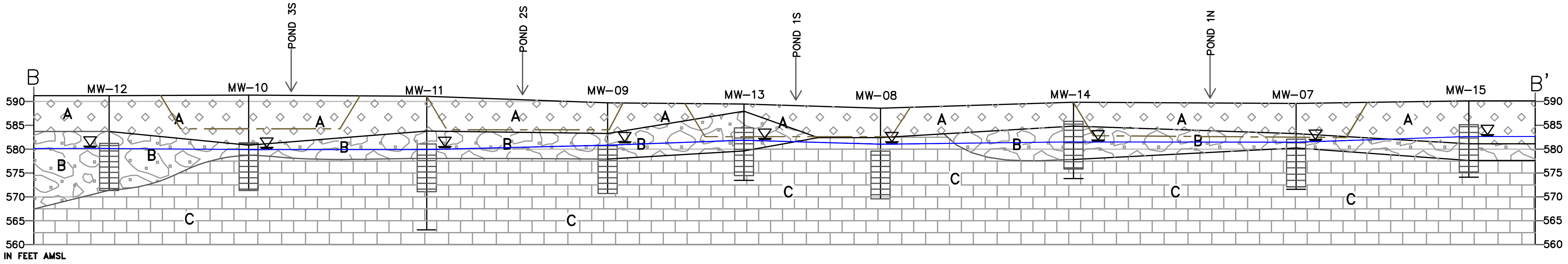
CROSS SECTION A–A'

WILL COUNTY STATION
ROMEOVILLE, ILLINOIS

SEE SCALE	Date: March 24, 2022
KPRG Project No. 19520.3	FIGURE 9–2



A FILL: CONSISTING OF BROWN AND BLACK SILTY CLAY AND SILTY SAND MIXED WITH GRAVEL AND CRUSHED LIMESTONE. THE FILL MAY INCLUDE COAL, BLACK CINDERS AND SLAG.

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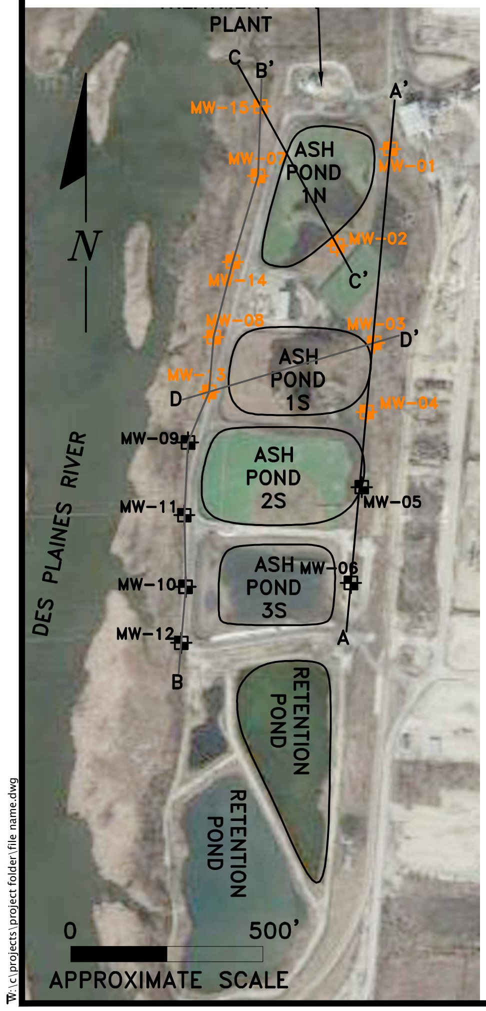
▽ WATER LEVEL (5/21)

—— – —— PROJECTED POND OUTLINE



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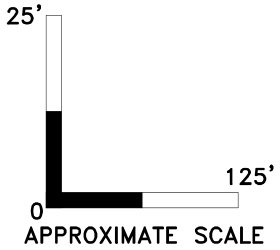

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CROSS SECTION B–B'

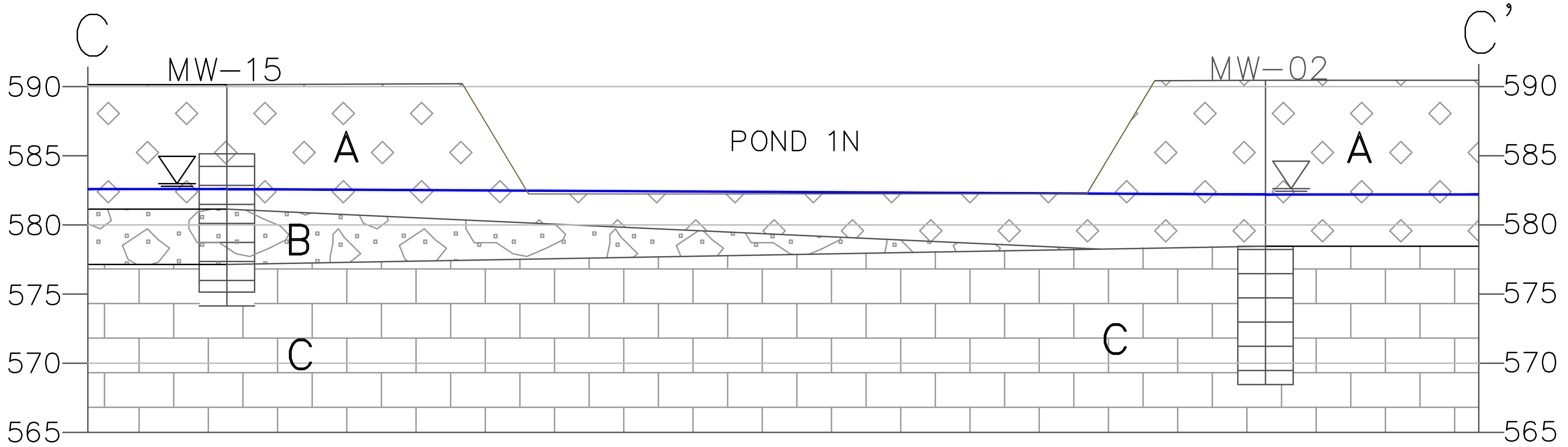
WILL COUNTY STATION
ROMEOVILLE, ILLINOIS

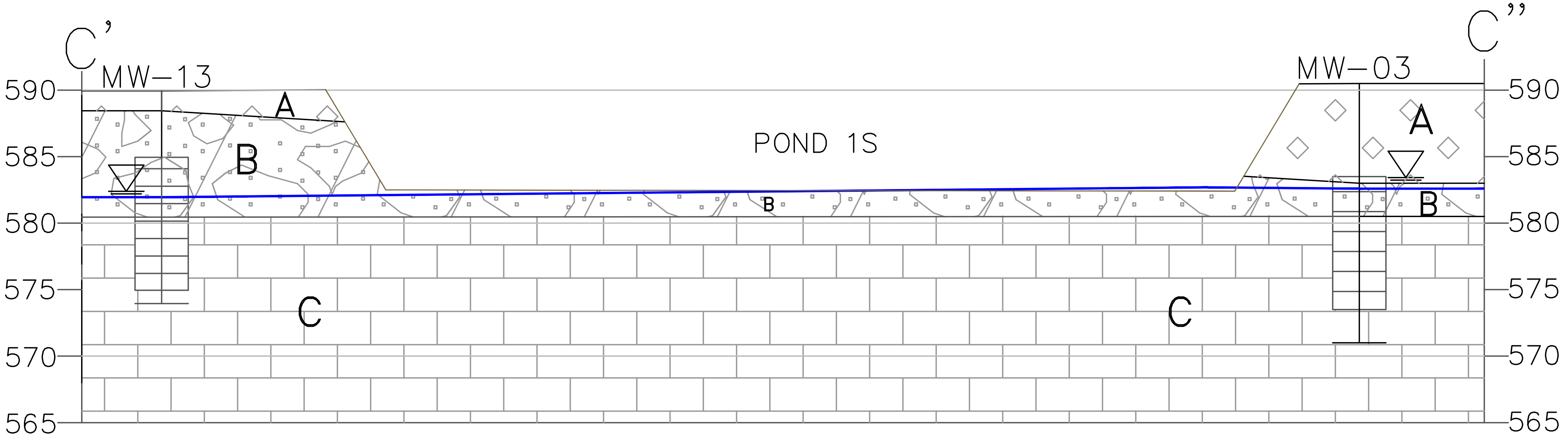
SEE SCALE

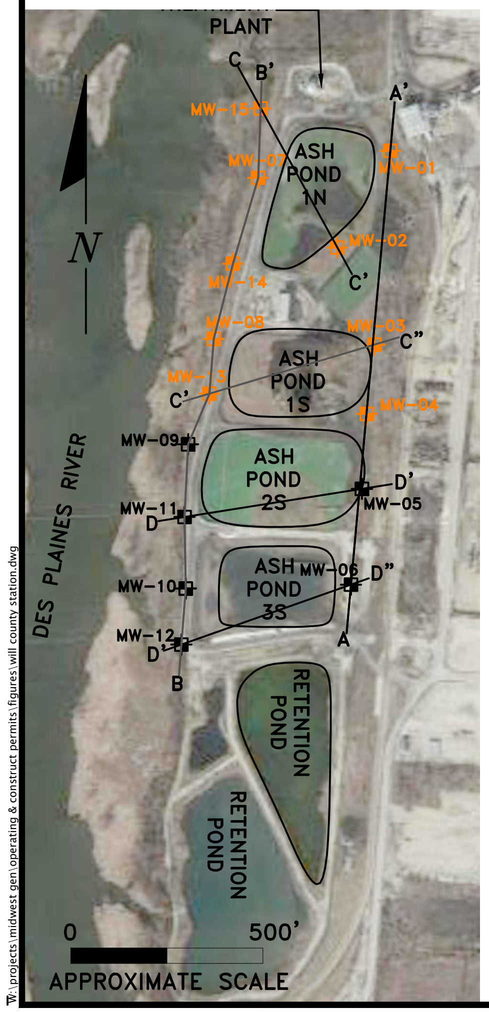
Date: March 24, 2022

KPRG Project No. 19520.3

FIGURE 9–3







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A	FILL: CONSISTING OF BROWN AND BLACK SILTY CLAY AND SILTY SAND MIXED WITH GRAVEL AND CRUSHED LIMESTONE. THE FILL MAY INCLUDE COAL, BLACK CINDERS AND SLAG.
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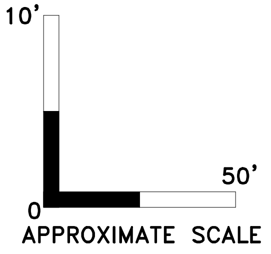
▽	WATER LEVEL (5/21)
—	POND OUTLINE



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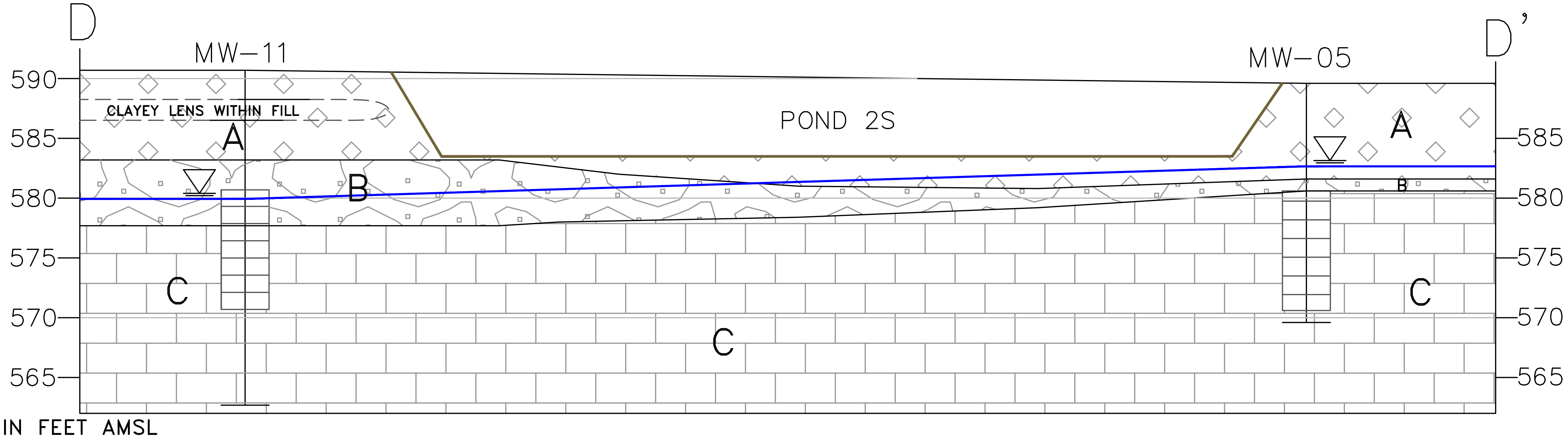
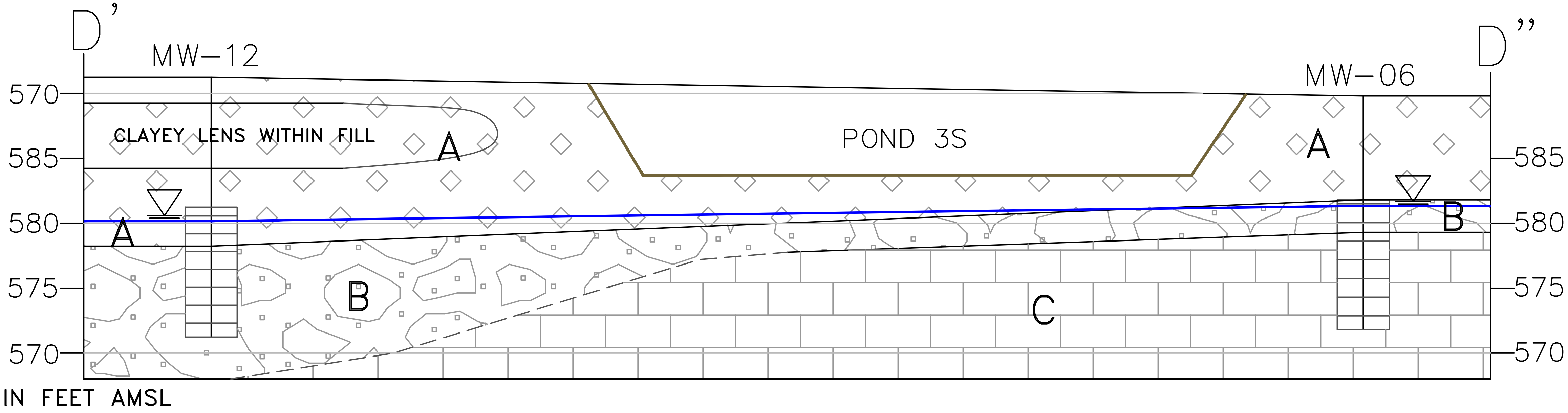
414 Plaza Drive, Suite 106 Westmont, Illinois 60559 Telephone 630-325-1300 Facsimile 630-325-1593

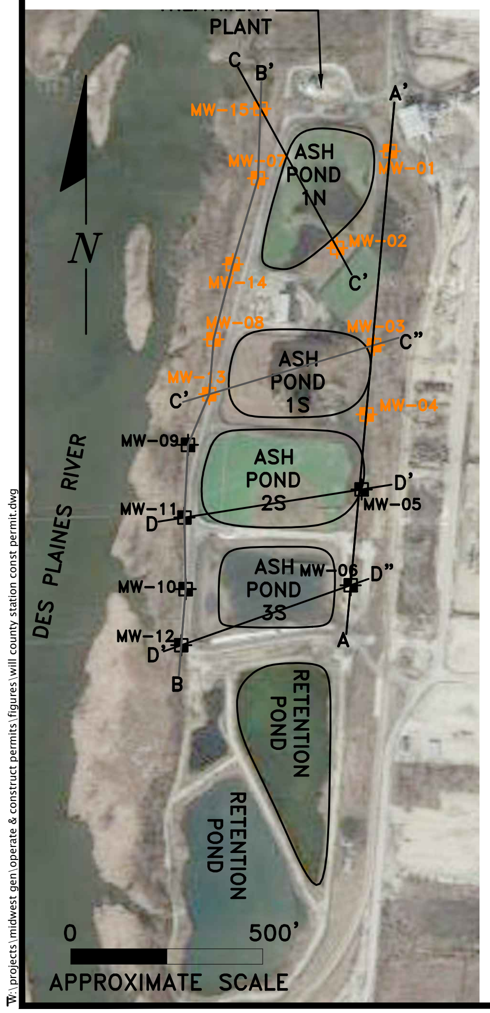
POND 1N CROSS SECTION C-C' and
POND 1S CROSS SECTION C'-C''

WILL COUNTY STATION
ROMEOVILLE, ILLINOIS

SEE SCALE
Date: July 28, 2023
KPRG Project No. 19520.3
FIGURE 9-4







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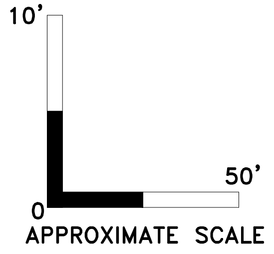
▽ WATER LEVEL (5/21)

— POND OUTLINE



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414 Plaza Drive, Suite 106 Westmont, Illinois 60559 Telephone 630–325–1300 Facsimile 630–325–1593

POND 2S CROSS SECTION D–D' and
POND 3S CROSS SECTION D'–D''

WILL COUNTY STATION
ROMEOVILLE, ILLINOIS

SEE SCALE	Date: July 28, 2023
KPRG Project No. 19620.3	FIGURE 9–5

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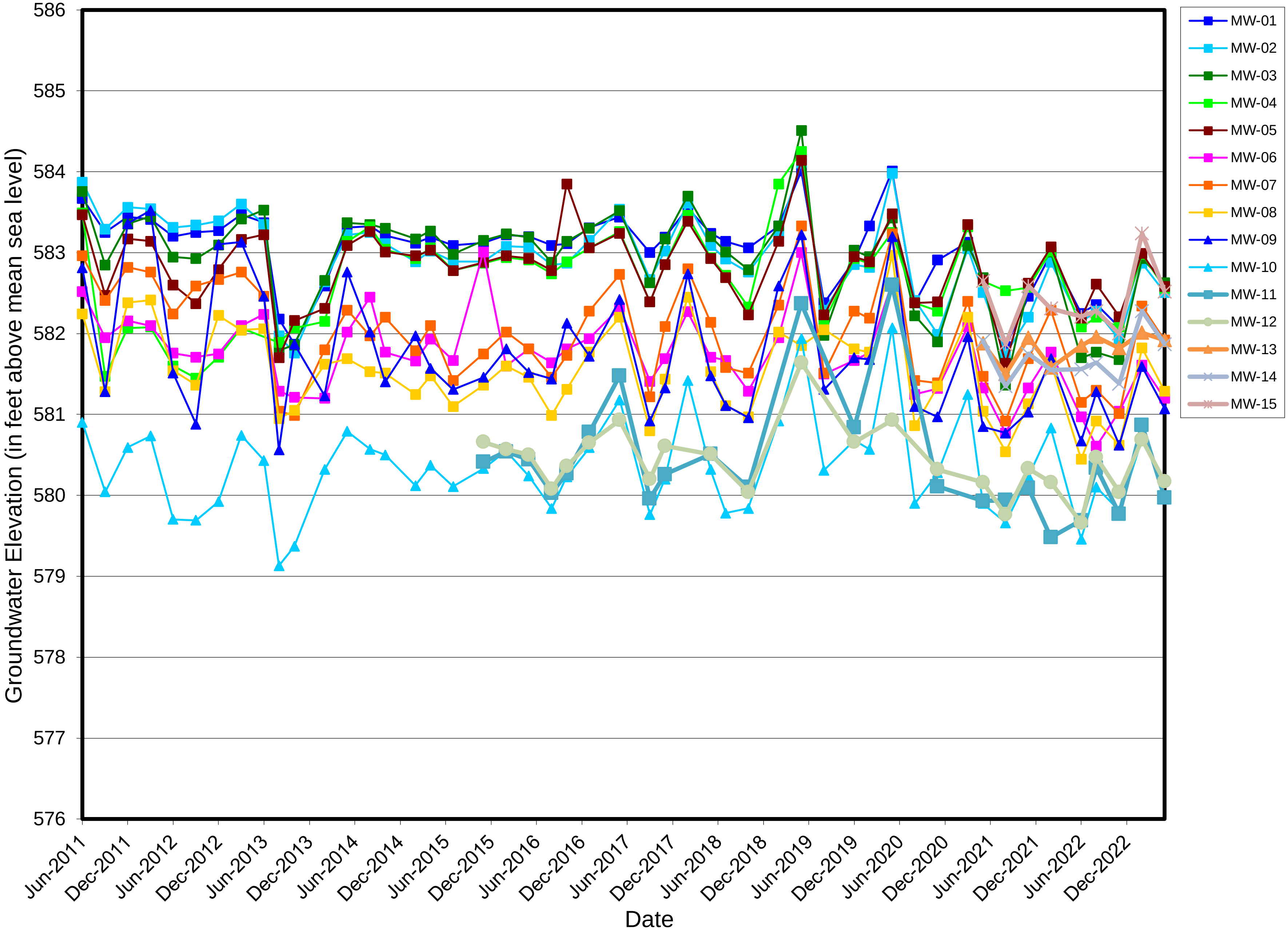
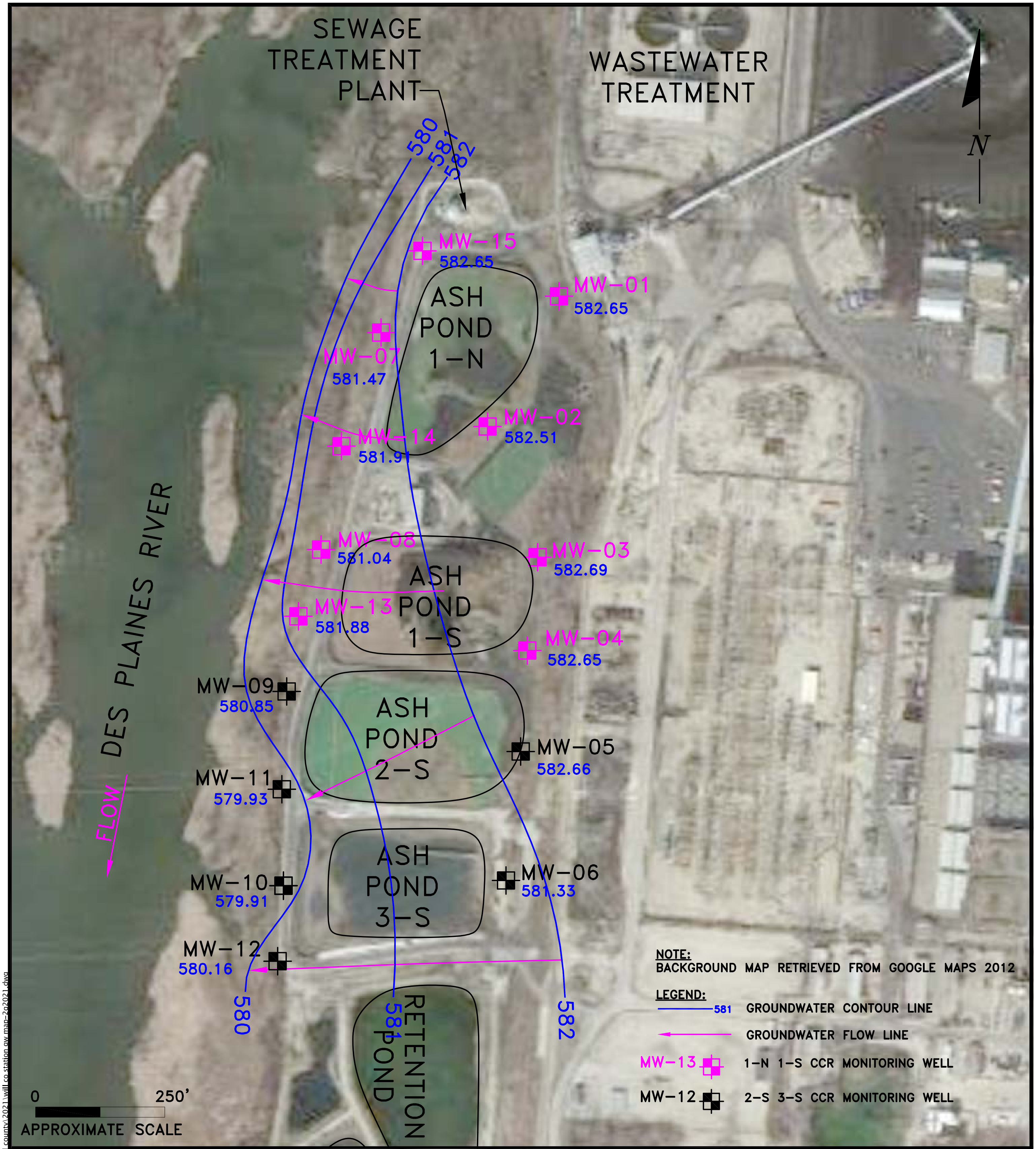
Figure 9-6

Midwest Generation Will County Station, Romeoville, IL

Groundwater Elevation vs Time





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POTENTIOMETRIC MAP 05/2021

WILL COUNTY STATION, PONDS 1-N 1-S,
ROMEOVILLE, ILLINOIS

Scale: 1" = 250'

Date: January 18, 2022

KPRG Project No. 12313.3

Figure 9-7

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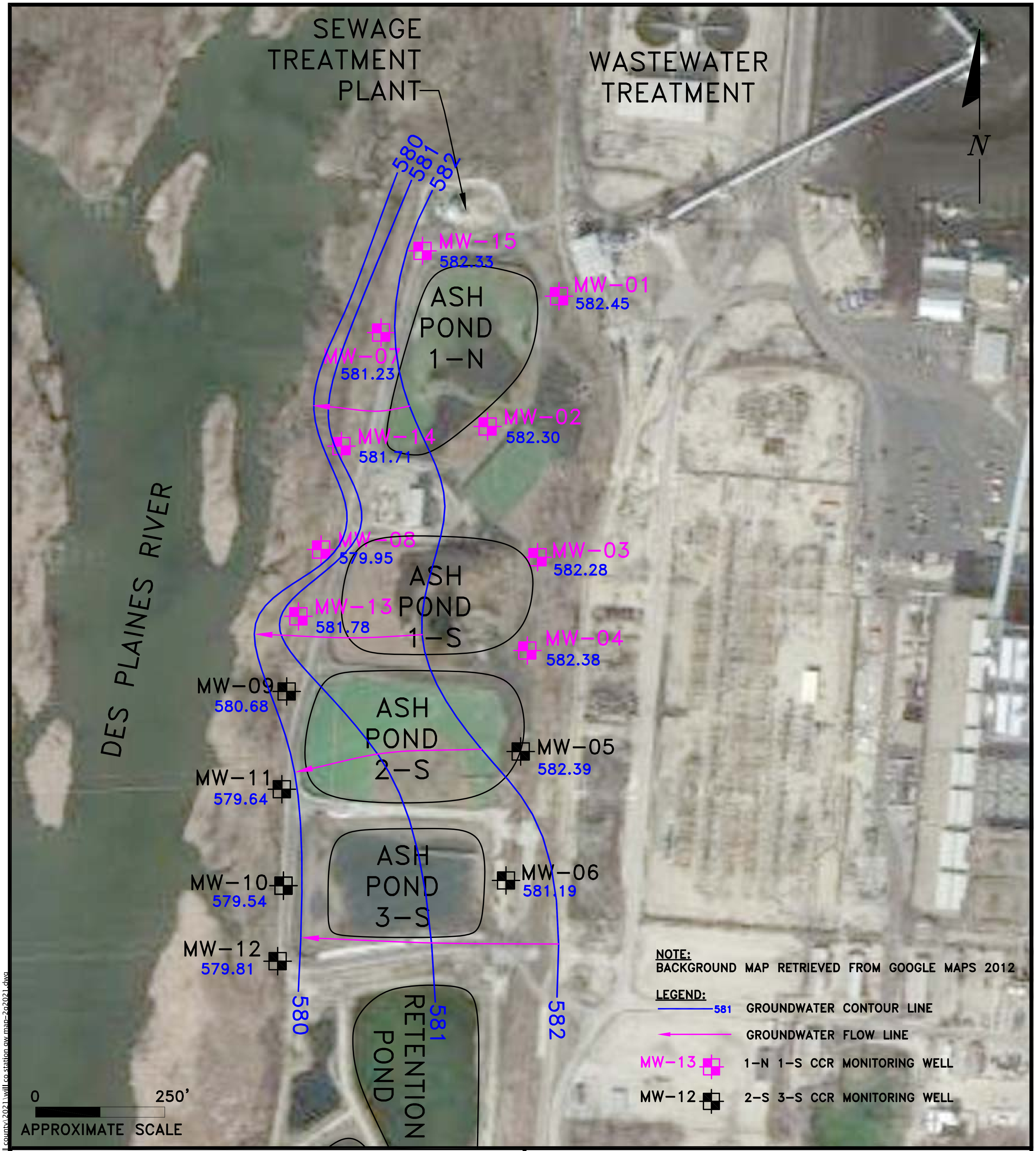


E N V I R O N M E N T A L C O N S U L T A T I O N & R E M E D I A T I O N

K P R G

KPRG and Associates, inc.

14665 West Lisbon Road, Suite 1A Brookfield, Wisconsin 53005 Telephone 262-781-0475 Facsimile 262-781-0478

414 Plaza Drive, Suite 106 Westmont, Illinois 60559 Telephone 630-325-1300 Facsimile 630-325-1593

POTENTIOMETRIC MAP 06/2021

WILL COUNTY STATION, PONDS 1−N 1−S,
ROMEOVILLE, ILLINOIS

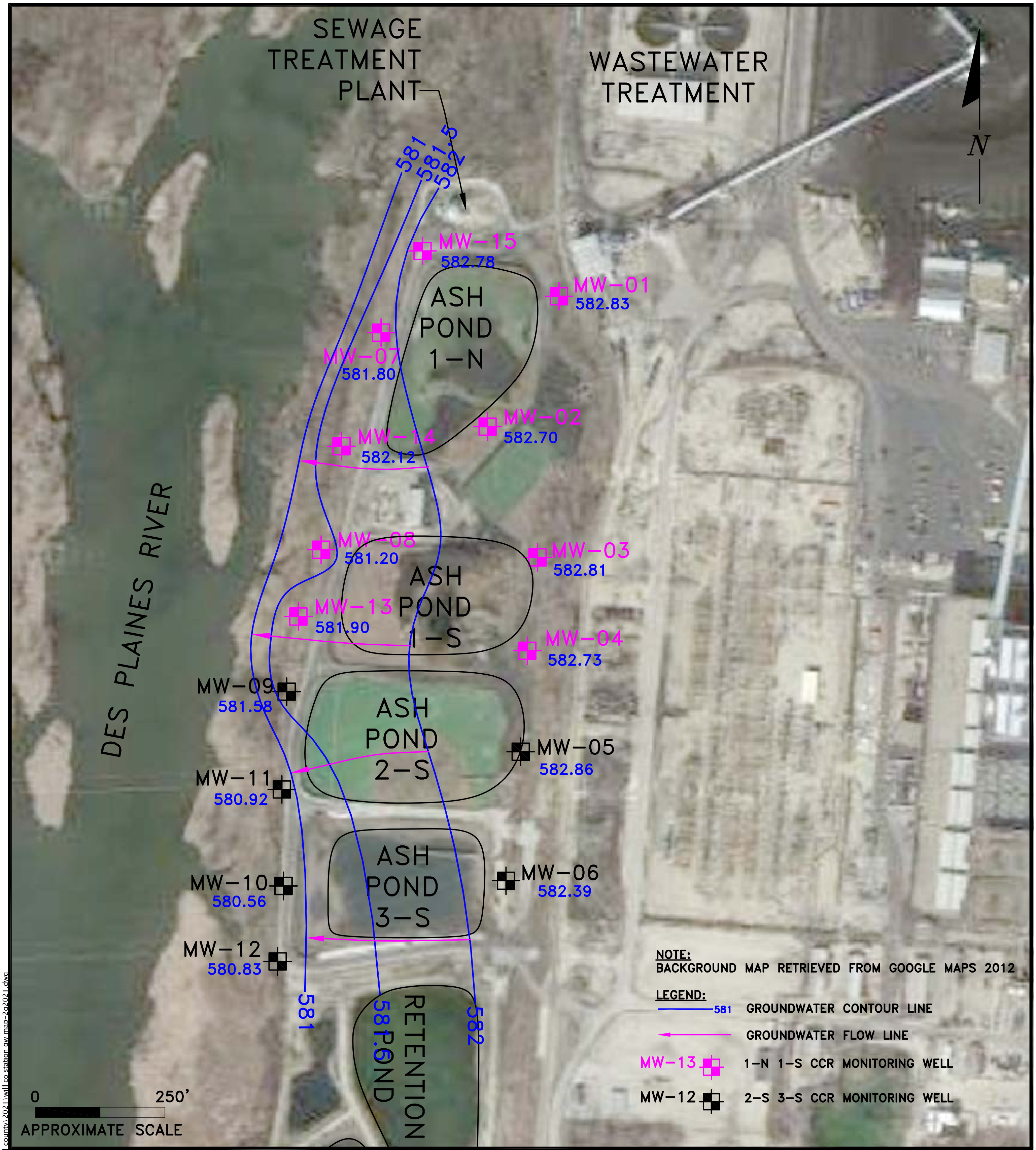
Scale: 1" = 250'

Date: January 18, 2022

KPRG Project No. 12313.3

Figure 9−8

W:\projects\midwest generation\12313\figures\will county\2021\will co station gw map-2q2021.dwg



NOTE:
BACKGROUND MAP RETRIEVED FROM GOOGLE MAPS 2012

LEGEND:

581	GROUNDWATER CONTOUR LINE
←	GROUNDWATER FLOW LINE
MW-13 ▣	1-N 1-S CCR MONITORING WELL
MW-12 ▣	2-S 3-S CCR MONITORING WELL

W:\projects\midwest generation\12313\figures\will county\2021\will co station gw map-2q2021.dwg

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POTENTIOMETRIC MAP 07/2021

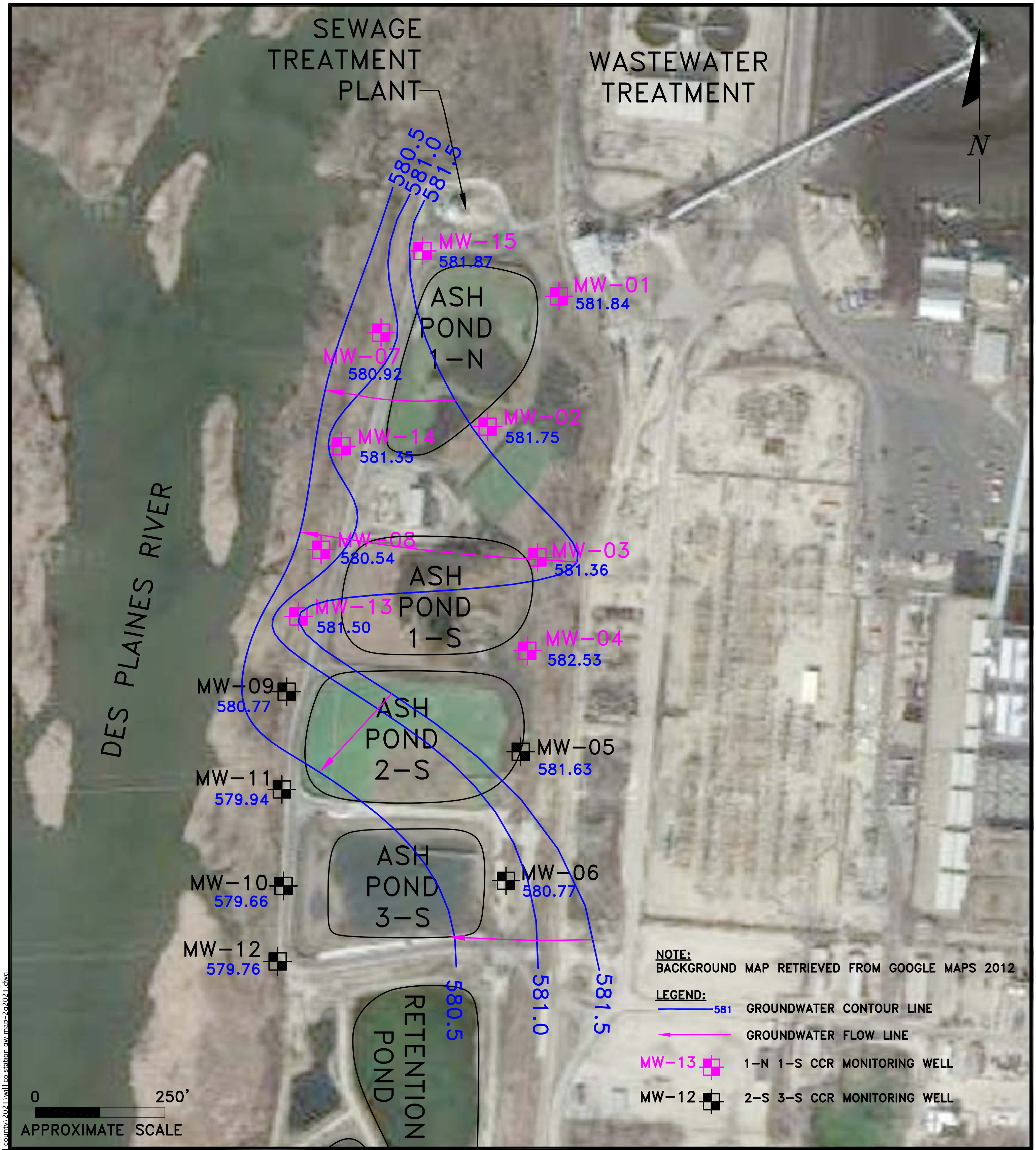
WILL COUNTY STATION, PONDS 1-N 1-S,
ROMEOVILLE, ILLINOIS

Scale: 1" = 250'

Date: January 18, 2022

KPRG Project No. 12313.3

Figure 9-9



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POTENTIOMETRIC MAP 08/2021

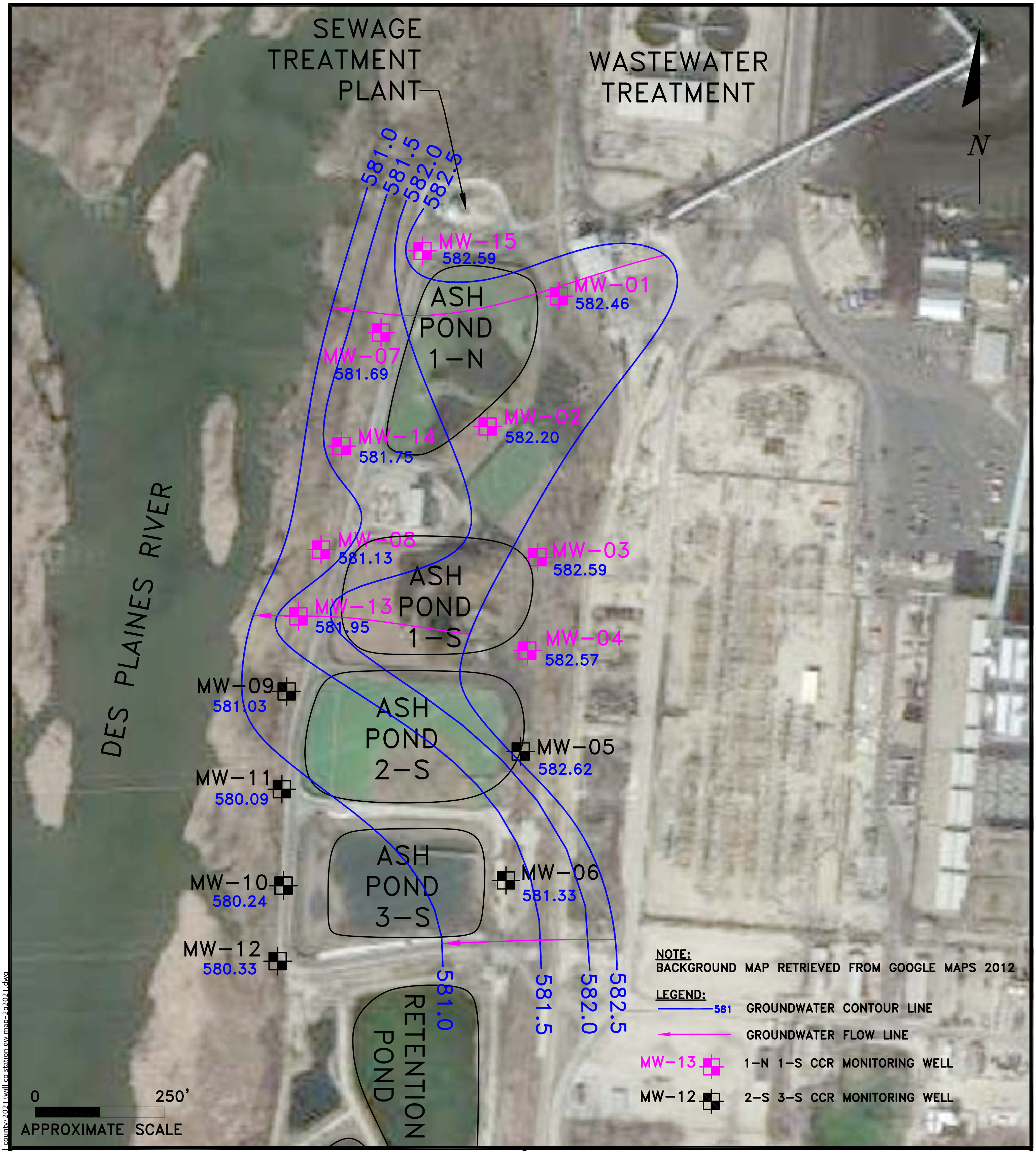
WILL COUNTY STATION, PONDS 1-N 1-S,
ROMEOVILLE, ILLINOIS

Scale: 1" = 250'

Date: January 18, 2022

KPRG Project No. 12313.3

Figure 9-10



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POTENTIOMETRIC MAP 11/2021

WILL COUNTY STATION, PONDS 1−N 1−S,
ROMEOVILLE, ILLINOIS

Scale: 1" = 250'

Date: January 18, 2022

KPRG Project No. 12313.3

Figure 9−11

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GROUNDWATER MANAGEMENT ZONE

WILL COUNTY STATION
ROMEOVILLE, ILLINOIS

Scale: 1" = 500'
Date: August 27, 2021
KPRG Project No. 18311.41
FIGURE 9-12

W:\c-p&p\projects\midwest generation\ash pond issues\eluc & gmz\will co station gmz.dwg(proposed gmz)

LEGEND

● WATER WELLS
40020 SHORT API WELL ID
300 TOTAL DEPTH

0 800'
APPROXIMATE SCALE

ENVIRONMENTAL CONSULTATION & REMEDIATION

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KPRG and Associates, inc.

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414 Plaza Drive, Suite 106 Westmont, Illinois 60559 Telephone 630-325-1300 Facsimile 630-325-1593

2500' RADIUS POTABLE WELLS MAP

WILL COUNTY GENERATING STATION
ROMEOVILLE, ILLINOIS

Scale: 1" = 800'
Date: September 10, 2021
KPRG Project No. 19520.3
FIGURE 9-13

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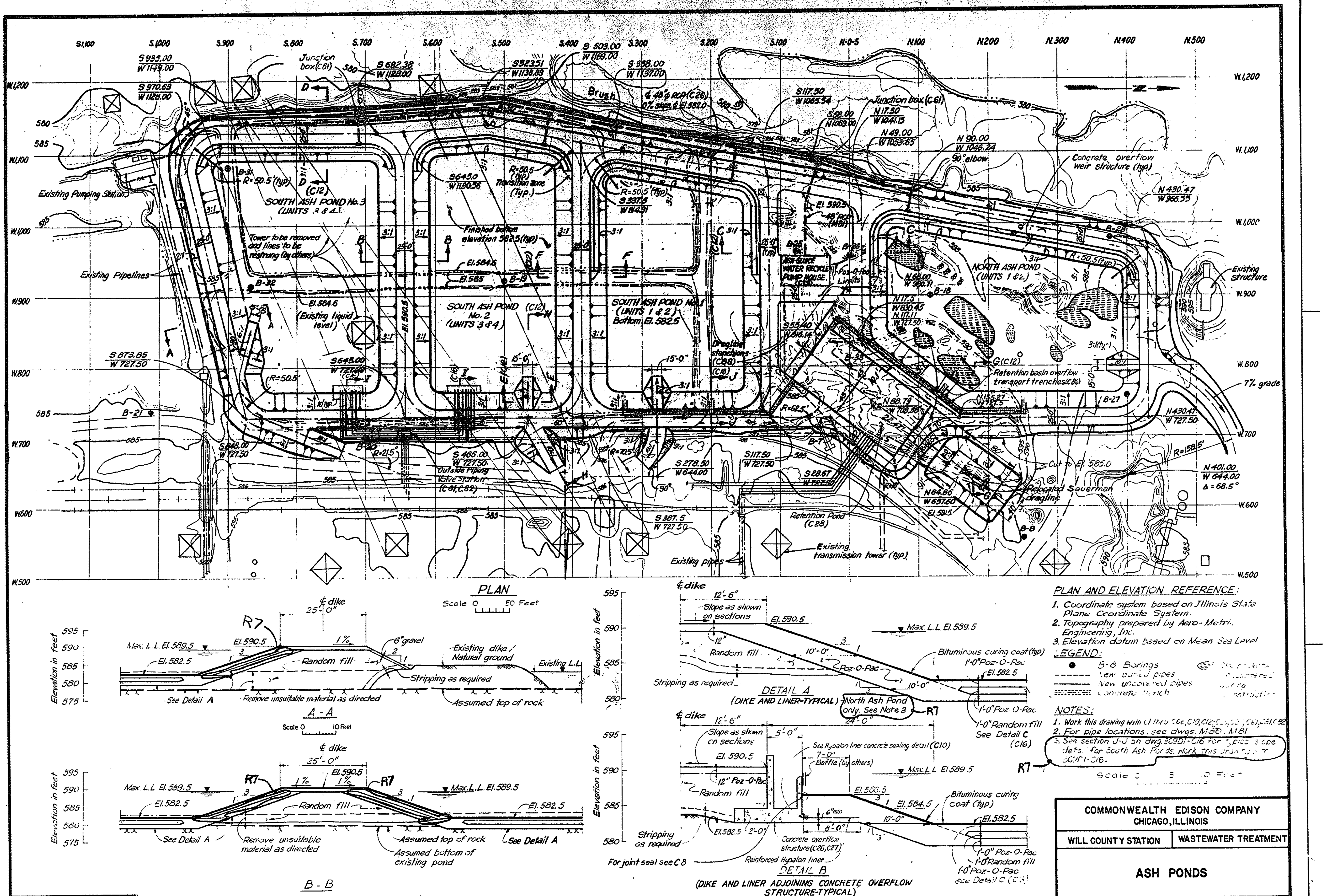
CONSTRUCTION PERMIT ATTACHMENTS

ATTACHMENT 1
HISTORY OF CONSTRUCTION

Attachment 1-1 – NUS Construction Drawings



PLAN AND ELEVATION REFERENCE:

1. Coordinate system based on Illinois State Plane Coordinate System.
2. Topography prepared by Aero-Metric Engineering, Inc.
3. Elevation datum based on Mean Sea Level

LEGEND:

● B-8 Borings
------ New buried pipes
—— New uncovered pipes
▨ Concrete trench
▨ Clay pockets encountered during construction

NOTES:

1. Work this drawing with C1 thru C6c, C10, C12, C26, C27, C61, C81, C82
2. For pipe locations, see dwgs. M80, M81
3. See section J-J on dwg. 869DI-C16 for typical slope dets. for South Ash Ponds. Work this drawing with 869DI-C16.

R7

Scale 0 5 10 Feet

COMMONWEALTH EDISON COMPANY
CHICAGO, ILLINOIS

WILL COUNTY STATION | WASTEWATER TREATMENT

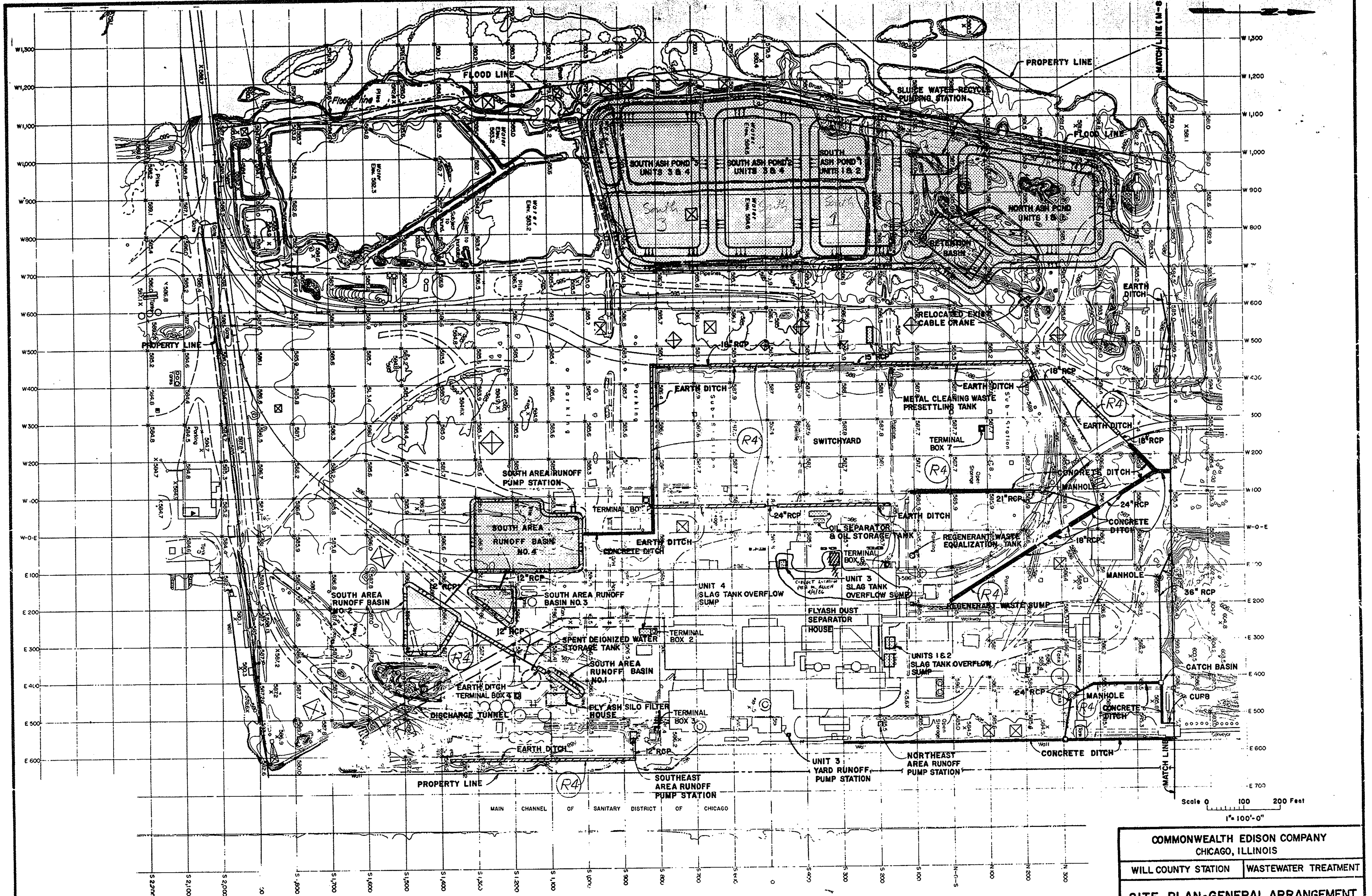
ASH PONDS

CONSULTING ENGINEERS
HARZA ENGINEERING COMPANY
APPROVED

CHICAGO, ILLINOIS
DATE NOV., 1977
DWG. NO. 869 DI - C11

DSGN.	AJF	REVIEWED	
CHKD.	WJM	CIVIL	YKC
DWN.	M.M.	MECH.	
CHKD.	[illegible]		
SUBM.	WJM	ELECT.	

REV. NO.	DWG. TRANSMITTAL LETTER NO.	DATE	NATURE OF REVISION	BY	CHKD.	APPD.
R7	DDR 869DI-C4 #83	8/14/79	Bottom ash/shot rock substituted for Poz-O-Pac	CLP	AJF	[illegible]
R6	DDR 869DI-C4 #72	3-13-79	Clay pockets during construction	CW	AJF	YKC
R-5	DDR 869DI-C4 #43	10-13-78	Plan, detail B revised as shown	CW	AJF	YKC
R4	DDR 869DI-C4 #32	[illegible] 78	Plan revised as shown, Legend addition	MM/SE	AJF	YKC
R3	DDR 869DI-C4 #3	[illegible]	Issued to Construction 869DI-C4	RJM	AJF	YKC
R2	DDR 869DI-C4 #[illegible]	4/25/78	Fill & structures added as shown, details revised, and dwg references added	J.V.	AJF	YKC
R1	DDR 869DI-C4 #1	4/7/78	Issued for construction Contract 869DI-C4	M.M.	AJF	[illegible]
R0		12-12-77	Issued for Bids 869 DI-C4	M.M.	AJF	[illegible]



3 Basins feed into South Area Runoff Basin.
SAR Basin feeds to one of the Ash Ponds

NE Area Runoff goes to N area runoff basin

R4	7-26-10	Revised type & location of ditches 869DI-C4	V.M.		
R3	5-2-78	Issued for construction: Contract 869DI-C6	R.L.	JHW	
R2	4-5-78	Issued for construction contract 869DI-C4	F.S.	JHW	
R1	1-26-78	Issued for construction 869DI-C5 as reference	F.S.	JHW	
R.0	12-28-77	Issued for bid 869DI-C6			
R.0	12-12-77	Issued for bid 869DI-C4.			
REV. NO.	DATE	NATURE OF REVISION	BY	CHKD.	APPD.

		REVIEWED	
DSGN.	F.F.	CIVIL	
CHKD.	F.C.	MECH	
DWN.			
CHKD.		ELECT.	
SUBM.			

COMMONWEALTH EDISON COMPANY
CHICAGO, ILLINOIS

WILL COUNTY STATION | WASTEWATER TREATMENT

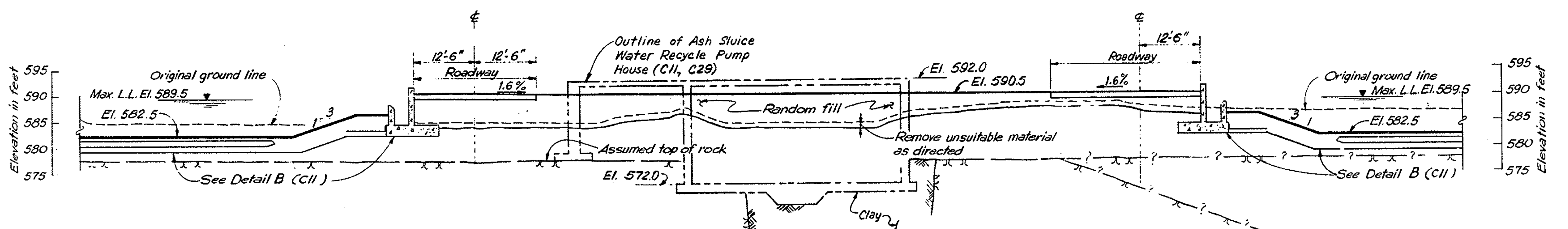
SITE PLAN-GENERAL ARRANGEMENT
SHEET 1 OF 2

HARZA ENGINEERING COMPANY
APPROVED

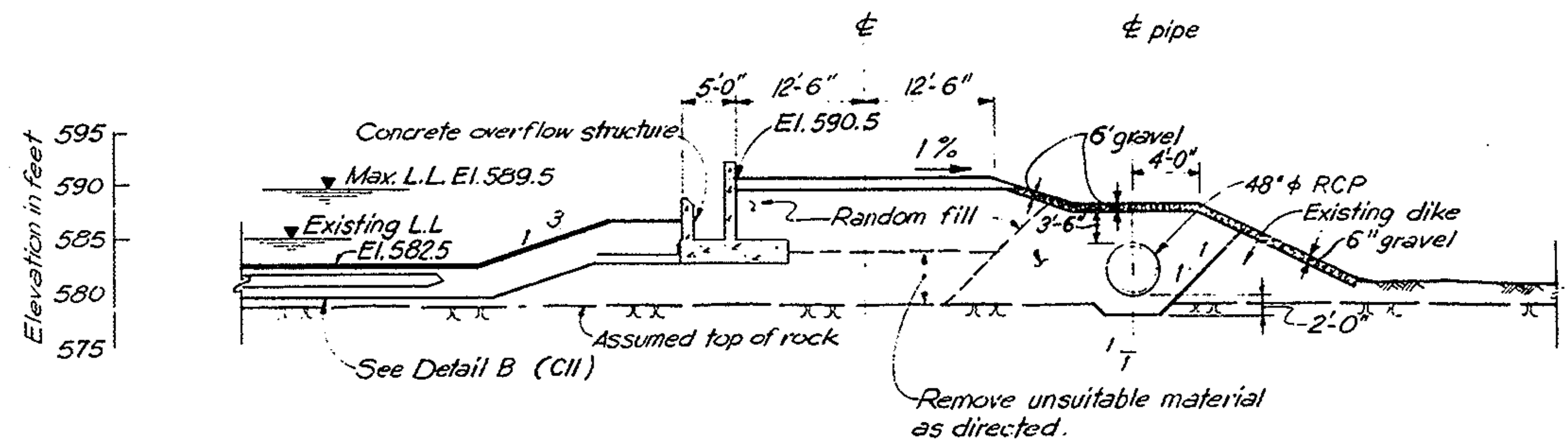
CHICAGO, ILLINOIS | DATE APRIL 1977 | DWG. NO. 869DI M-7

DDR 869DI-C6 #16

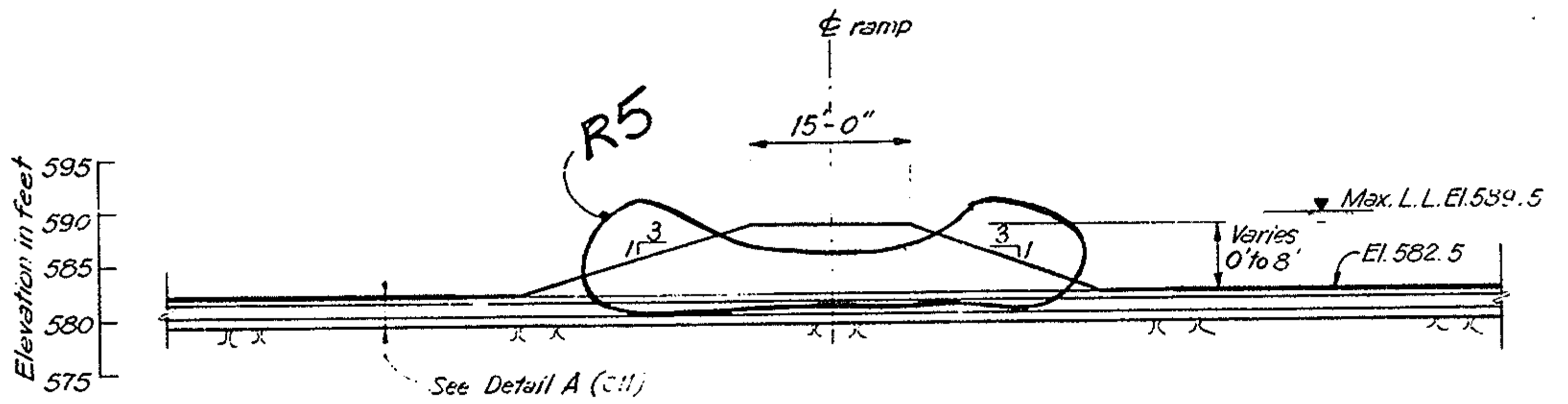
K&E CO. 10-1593



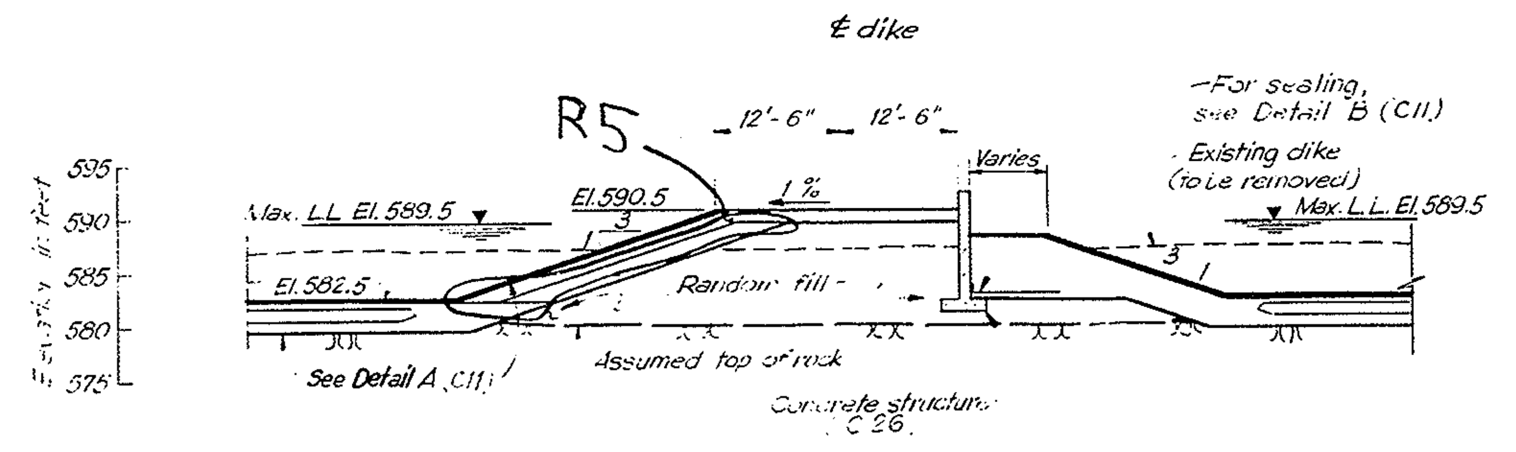
C-C (C11)



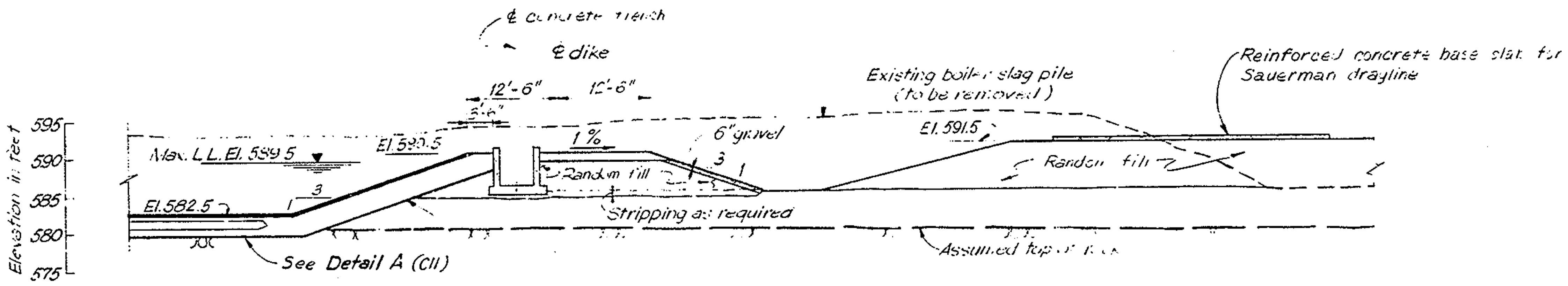
D-D (C11)



E-E (C11)



F-F (C11)

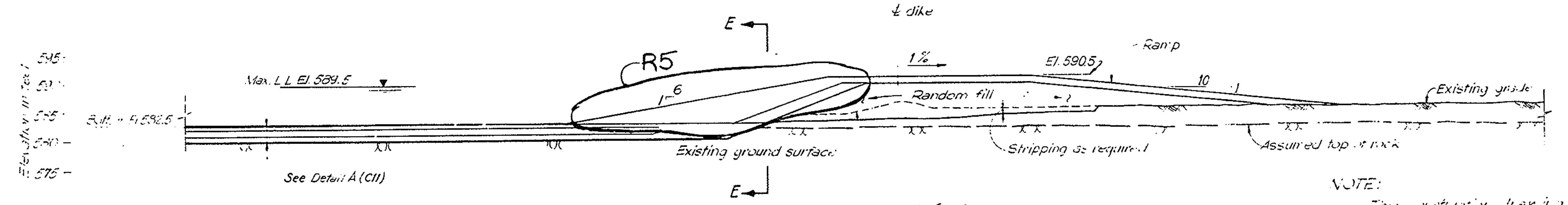


G-G (C11)

NOTE:

1. Work this drawing with C1 thru C6...
2. Work this drawing with 869DI-C16.

R5



H-H (C11)

NOTE:

This construction drawing 869 DI-C12 replaces dwg 869 DI-C12 ...

R5		8/14/79	Bottom ash/slit rock substituted for Poz-O-Pac.	CLP	AJF	
R4			Sect. C-C, E-E & H-H revised	JLW	AJF	
R3	DLF Sec. DI-C4 • 32	8/25/78	Sect. C-C, D-D, E-E, G-G & H-H revised	J.M./S.F.	AJF	
R2		4/25/78	Sections F-F and D-D revised	J.V.	AJF	
R1		4.5.78	Issued for Construction Contract 869 DI-C4	M.M.	AJF	
R0		12-12-77	Issued for Bids 869 DI-C4		AJF	
REV. NO.	DWG. TRANSMITTAL LETTER NO.	DATE	NATURE OF REVISION	BY	CHKD.	APPD.

DSGN	AJF	REVIEWED	
CHKD	WJM	CIVIL	
DWN	M.M.	MECH	
CHKD.	AJF	ELECT	
SUBM.	WJM		

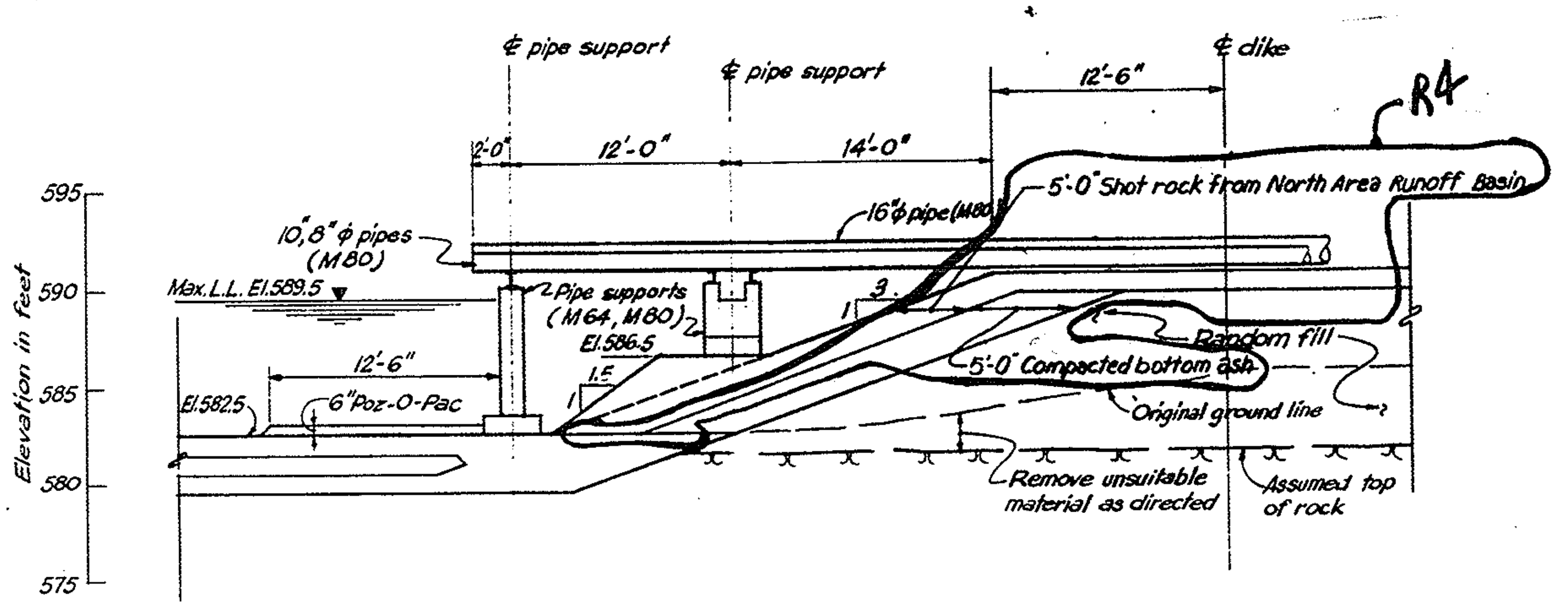
COMMONWEALTH EDISON COMPANY
CHICAGO, ILLINOIS

WILL COUNTY STATION | WASTEWATER TREATMENT

ASH POND SECTIONS

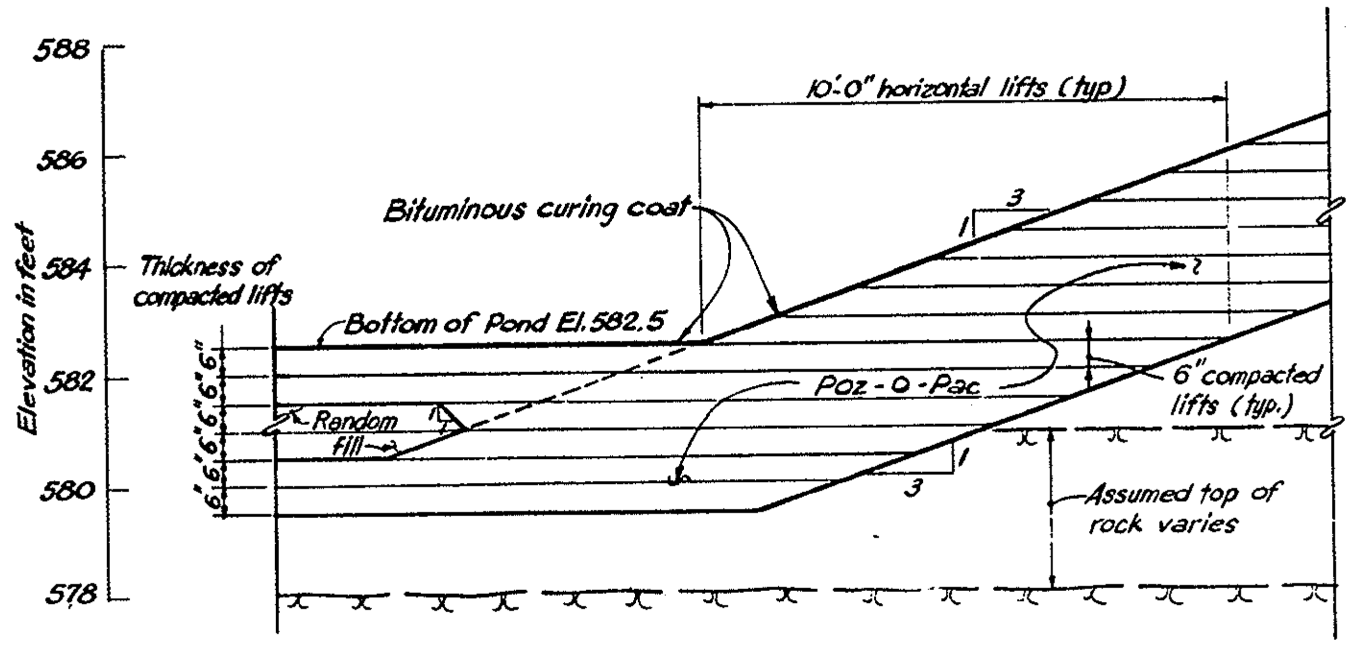
CONSULTING ENGINEERS
HARZA ENGINEERING COMPANY
APPROVED

CHICAGO, ILLINOIS
DATE NOV., 1977
DWG. NO. 869-DI-C12



I - I (C11)

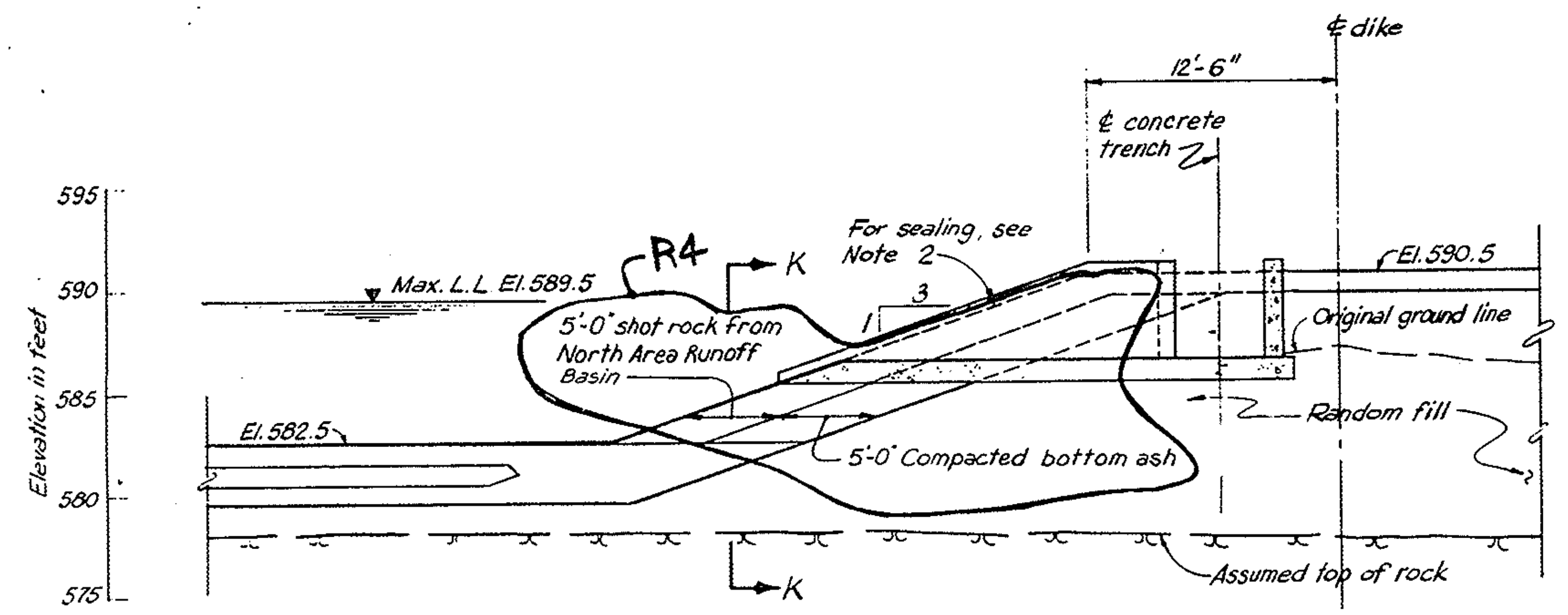
Scale 0 5 Feet



DETAIL C

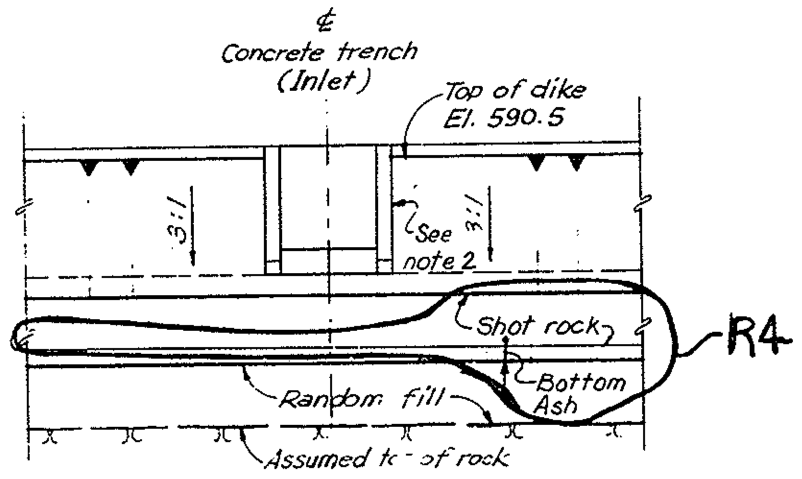
(POZ-O-PAC PLACEMENT IN ASH POND)

Scale 0 2 Feet



J - J (C11)

Scale 0 5 Feet



K - K

Scale 0 5 Feet

NOTES:

1. Work this drawing with C1 thru C6c, C11 and C12.
2. Apply joint sealant as directed by the Owners Representative, at concrete/Poz-O-Pac joints.

DSGN.	AJF	REVIEWED	
CHKD	MM	CIVIL	
DWN.		MECH.	
CHKD.	AJF		
SUBM.	AJF	ELECT.	

REV. NO.	DWG. TRANSMITTAL LETTER NO.	DATE	NATURE OF REVISION	BY	CHKD.	APPD.
R4	DLR 869 DI-C4 #33	8/14/79	Bottom ash/shot rock substituted for Poz-O-Pac.	CLP	AJF	
R3	DDR 869 DI-C4 #32	8/25/78	Sections and details revised as shown	M.M.	AJF	
R2	DDR 869 DI-C4 #4	4/25/78	Details and sections revised as shown	J.V.	AJF	
R1		4/5/78	Issued for construction contract 869 DI-C4	M.M.	AJF	

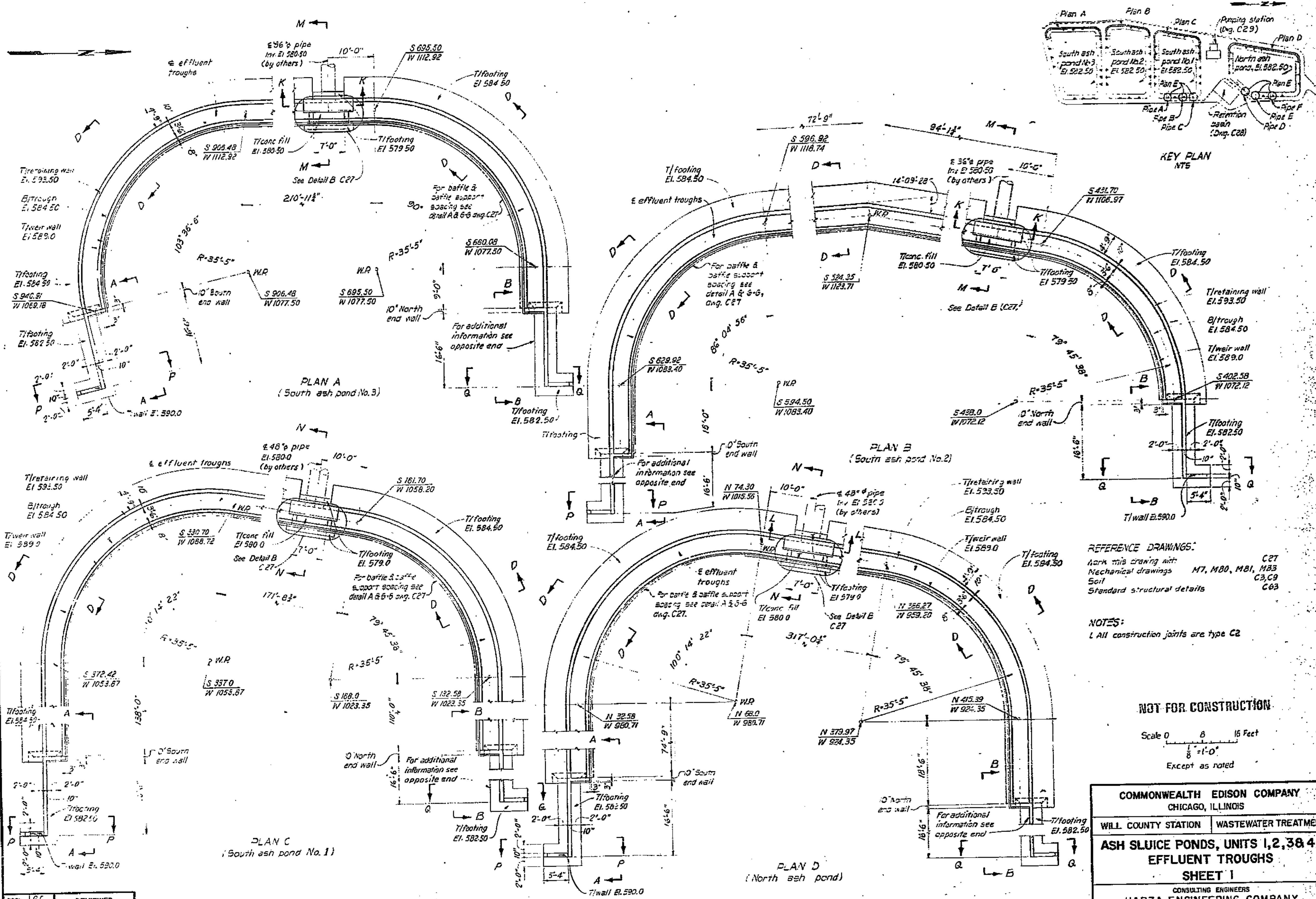
COMMONWEALTH EDISON COMPANY
CHICAGO, ILLINOIS

WILL COUNTY STATION | WASTEWATER TREATMENT

ASH POND SECTIONS & DETAILS

CONSULTING ENGINEERS
HARZA ENGINEERING COMPANY
APPROVED

CHICAGO, ILLINOIS
DATE APRIL, 1978
DWG. NO. 869 DI - C16



REFERENCE DRAWINGS:

Mark this drawing with	C27
Mechanical drawings	M7, M80, M81, M83
Soil	C3,C9
Standard structural details	C63

NOTES:

1. All construction joints are type C2

NOT FOR CONSTRUCTION

Scale 0 8 16 Feet
1/8"=1'-0"
Except as noted

RD		12/27/77	issued for bids 869 DI-C4			
REV. NO.	DWG. TRANSMITTAL LETTER NO.	DATE	NATURE OF REVISION	BY	CHKD.	APPD.

DSGN.	G.C.	REVIEWED	
CHKD.	J.B.A.	C VIL.	
DWN.	G.A.H.		
CHKD.	FS/VK	MECH.	
SUBM.		ELECT.	

COMMONWEALTH EDISON COMPANY
CHICAGO, ILLINOIS

WILL COUNTY STATION | WASTEWATER TREATMENT

ASH SLUICE PONDS, UNITS 1,2,3&4
EFFLUENT TROUGHS
SHEET 1

CONSULTING ENGINEERS
HARZA ENGINEERING COMPANY
APPROVED

CHICAGO, ILLINOIS
DATE NOV.1977
DWG.NO. 869DI-C26

JAN 13 1978 C4

Attachment 1-2 – Liner Replacement Drawings for Pond 2S

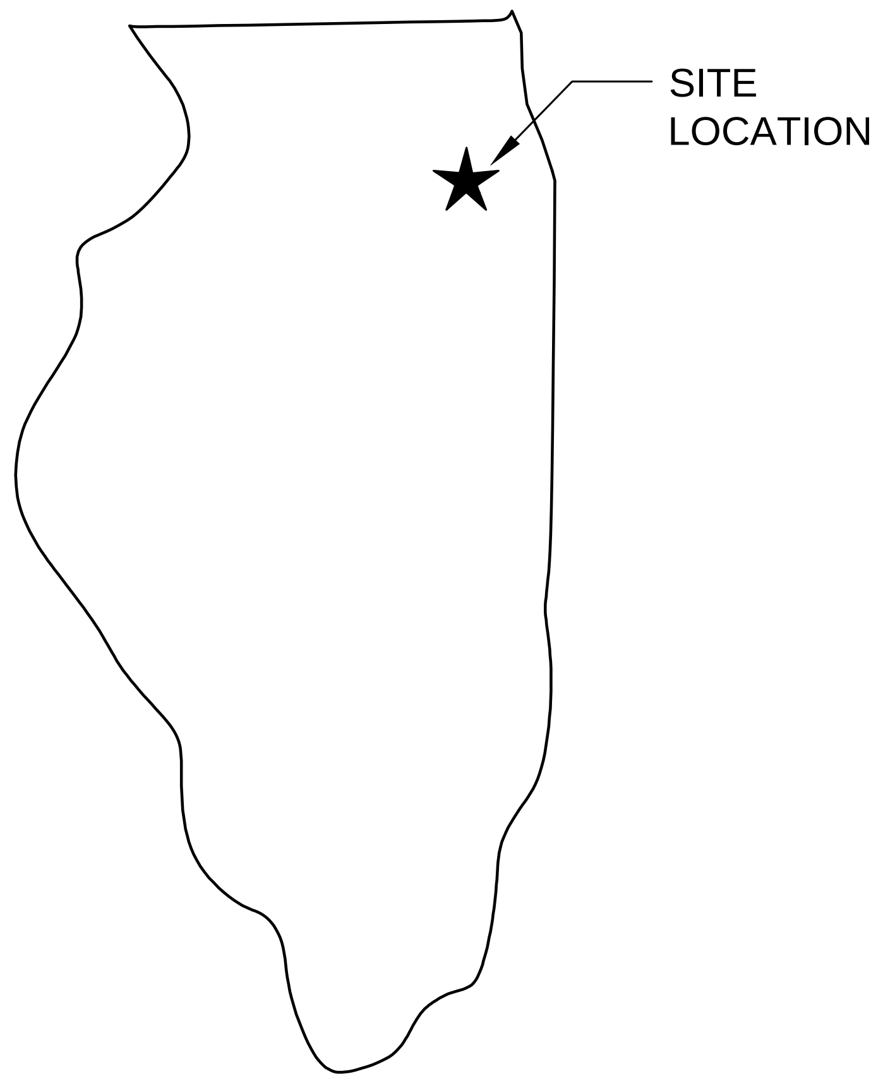
SOUTH ASH POND 2 LINER REPLACEMENT
WILL COUNTY GENERATING STATION
MIDWEST GENERATION
ROMEOVILLE, WILL COUNTY, ILLINOIS

LIST OF DRAWINGS

SHEET NO.	TITLE	DRAWING NO.
TS	TITLE SHEET	D21131TS-03
C010	PRE-CONSTRUCTION SITE CONDITIONS	D21131C010-03
C020	LINER SUBGRADE PREPARATION	D21131C020-03
C021	GEOMEMBRANE PANEL LAYOUT	D21131C021-00
C030	GEOCELL AND WARNING LAYER PLAN	D21131C030-03
C031	DETAILS AND SECTIONS	D21131C031-03
C032	GEOCELL DETAILS AND SECTIONS	D21131C032-03

RECORD DRAWING LEGEND

~~PROPOSED~~	CROSSED OUT TEXT INDICATES CHANGES FROM THE FINAL DESIGN TO RECORD CONSTRUCTION
PRE-CONSTRUCTION	UNDERLINED TEXT INDICATES ADDED NOTES OR COMMENTS, AND DOCUMENTS CHANGES FROM THE FINAL DESIGN TO RECORD CONSTRUCTION
☁	"CLOUDS" DOCUMENT ADDITIONS AND/OR CHANGES FROM THE FINAL DESIGN TO RECORD CONSTRUCTION
✕	"CROSS OUTS" DOCUMENT OBJECTS REMOVED FROM THE FINAL DESIGN TO RECORD CONSTRUCTION



ILLINOIS

PREPARED FOR:

MIDWEST GENERATION, LLC
528 E. 135TH STREET
ROMEOVILLE, IL 60446

JULY 2014

6.			
5.			
4.			
3.	ISSUED FOR RECORD DOCUMENTATION	07/03/14	EJT
2.	ISSUED FOR CONSTRUCTION	06/28/13	HMS
1.	ISSUED FOR BID	04/19/13	HMS
0.	ISSUED FOR PERMIT	12/20/12	HMS
REVISION:		DATE:	APP'D BY:

NATURAL
RESOURCE
TECHNOLOGY

PROJECT NO. 2113.1
DRAWN BY: RLH 12/19/12
CHECKED BY: RJB 12/19/12
APPROVED BY: HMS 12/20/12

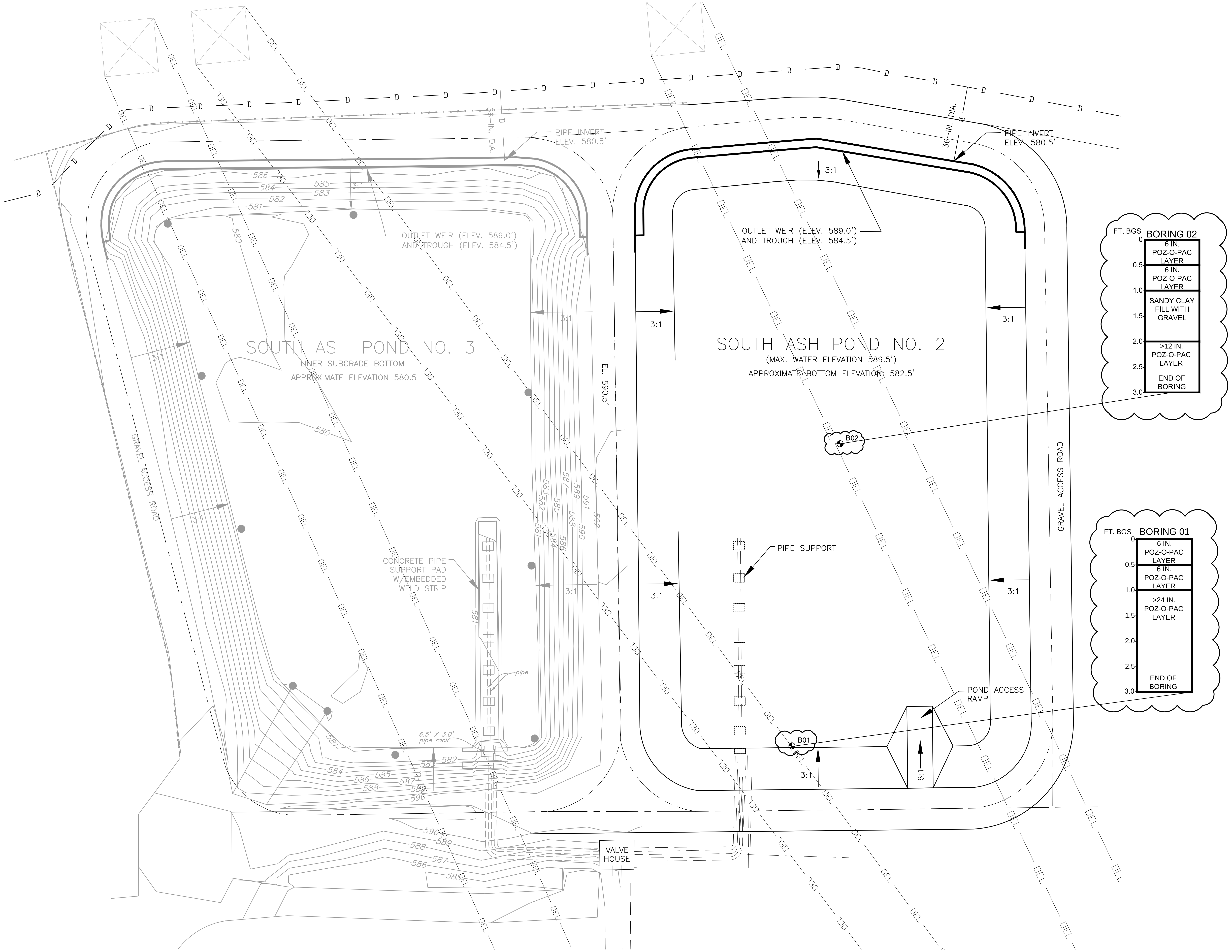
TITLE SHEET

SOUTH ASH POND 2 LINER REPLACEMENT
WILL COUNTY GENERATING STATION
MIDWEST GENERATION
ROMEOVILLE, WILL COUNTY, ILLINOIS

DRAWING NO: D21131TS-03
REFERENCE: .

SHEET NO.
TS

Jul 17, 2014 1:19pm PLOTTED BY: dduda SAVED BY: dduda
Y:\ACADdata\Projects\21\2113\21131_Will Co\RECORD DWGS\Final set 070314\D21131TS-03.dwg TS-02
IMAGES: Y:\ACADdata\Projects\18\1830\1\JOLIET.jpg; Y:\ACADdata\Projects\18\1845\SOURCE\MILWAUKEE.jpg; Y:\ACADdata\Projects\18\1845\SOURCE\MILWAUKEE-BW.jpg;
XREFS:



— — — — ABOVEGROUND INLET PIPE

—— D —— UNDERGROUND DISCHARGE PIPING

—— DEL —— OVERHEAD ELECTRIC LINE

B01 BORING LOCATION

● MARKER POST LOCATION

CONTRACTOR NOTES: △ COMPLETED DURING CONSTRUCTION

1. CONTRACTOR SHALL NOT DISTURB OPERATIONS OF ASH POND 3 WHEN WORKING ON ASH POND 2.

N

0 15 30 60

SCALE IN FEET

(APPROXIMATE)

SOURCE NOTES:

1. THIS DRAWING WAS DEVELOPED FROM DRAWING NO. 869D1-C11 REV. 7, BY HARZA ENGINEERING COMPANY, CHICAGO, ILLINOIS, DATED AUG. 1979, PROVIDED BY MIDWEST GENERATION.
2. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE. PIPING AND OTHER UTILITY LOCATIONS ARE APPROXIMATE.
3. <u>BORINGS WERE DRILLED BY BRIESER CONSTRUCTION COMPANY, INC. ON 07/17/13.</u>

6.			
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4.			
3.	ISSUED FOR RECORD DOCUMENTATION	07/17/14	EJT
2.	ISSUED FOR CONSTRUCTION	06/28/13	HMS
1.	ISSUED FOR BID	04/19/13	HMS
0.	ISSUED FOR PERMIT	12/20/12	HMS
REVISION:		DATE:	APP'D BY:

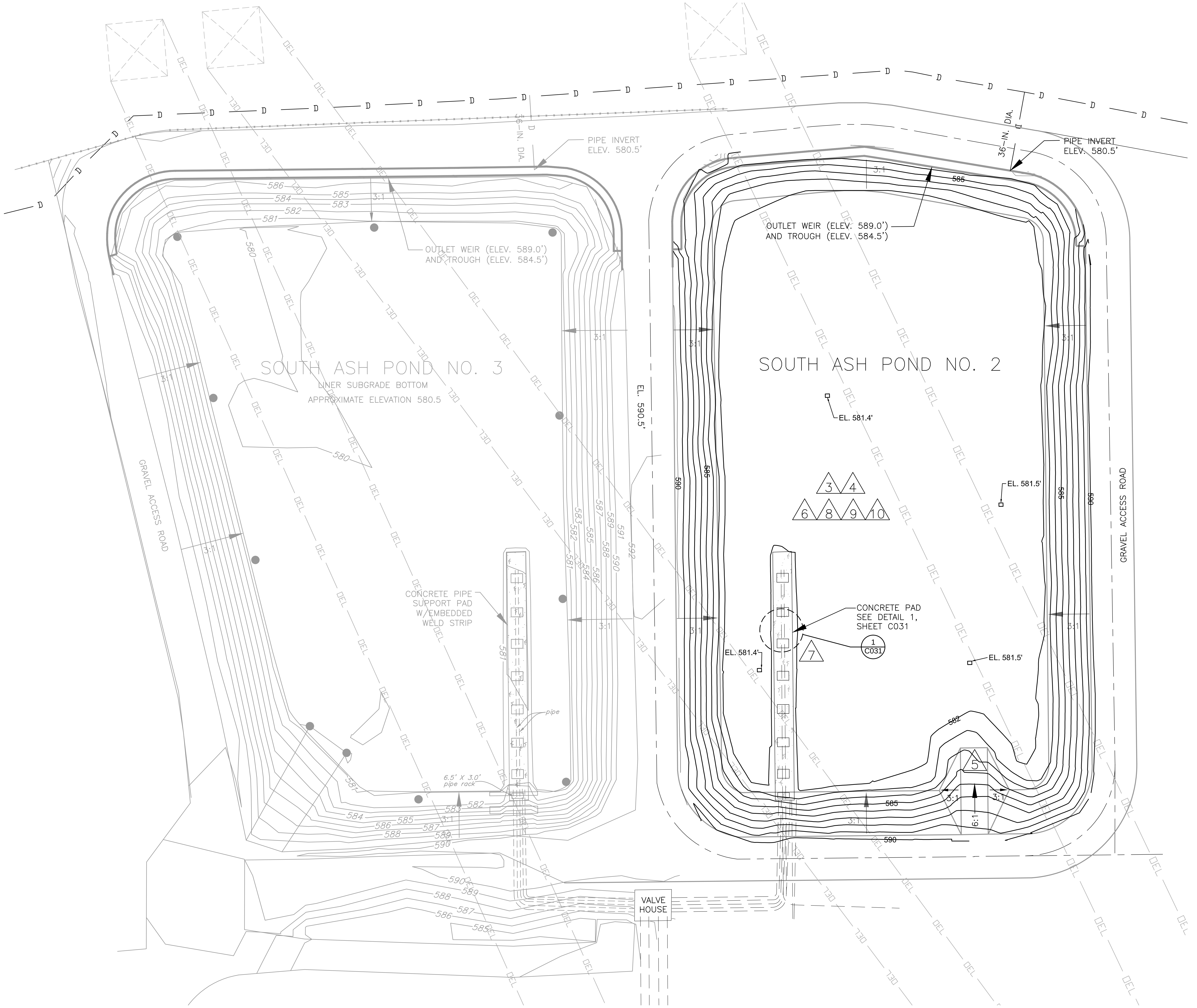
NATURAL
RESOURCE
TECHNOLOGY

PROJECT NO. 2113.1
DRAWN BY: RLH 12/19/12
CHECKED BY: RJB 12/19/12
APPROVED BY: HMS 12/20/12

PRE-CONSTRUCTION SITE CONDITIONS

SOUTH ASH POND 2 LINER REPLACEMENT
WILL COUNTY GENERATING STATION
MIDWEST GENERATION
ROMEOVILLE, WILL COUNTY, ILLINOIS

DRAWING NO: D21131C010-03
REFERENCE: .
SHEET NO. C010



〰	MAJOR CONTOUR LINE
〰	MINOR CONTOUR LINE
583	EXISTING CONTOUR
— — —	ABOVEGROUND INLET PIPE
········	EXISTING FENCE
— D —	UNDERGROUND DISCHARGE PIPING
— DEL —	OVERHEAD ELECTRIC LINE
●	MARKER POST LOCATION
▨	CONCRETE

CONTRACTOR NOTES: △ COMPLETED DURING CONSTRUCTION

1. CONTRACTOR SHALL STORE ~~ALL GEOSYNTHETICS AND~~ SUBGRADE MATERIALS IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS.
2. CONTRACTOR SHALL STORE AND STAGE EQUIPMENT AT LOCATION APPROVED BY MIDWEST GENERATION.
3. PROTECT ALL CONCRETE AND UTILITY STRUCTURES THROUGHOUT PROJECT DURATION.
4. CONTRACTOR SHALL REMOVE ALL VEGETATION, ROCKS, AND OTHER DEBRIS GREATER THAN 1 INCH IN SIZE FROM POND SUBGRADE AND DISPOSE OF IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS.
5. CONTRACTOR SHALL CLEAN OFF THE RAMP CONCRETE SURFACE TO THE EXTENT PRACTICAL TO REMOVE ROCKS THAT MAY POSE A HAZARD TO GEOMEMBRANE, AS APPROVED BY GEOMEMBRANE INSTALLER, ENGINEER AND/OR MWG.
6. ~~CONTRACTOR SHALL REMOVE ENTIRE LAYER OF EXISTING POZ-O-PAC LINER FROM THE BASE OF THE ASH POND AND 6 INCHES OF EXISTING FILL MATERIAL BELOW THE POZ-O-PAC, EXCLUDING AREA AROUND PIPE SUPPORTS, AS NEEDED TO ACHIEVE FINAL SUBGRADE ELEVATION 581 FT. LOWER LAYER OF POZ-O-PAC SHALL REMAIN IN PLACE.~~ CONTRACTOR SHALL REMOVE POZ-O-PAC LAYERS AND EXISTING FILL MATERIAL, AS NEEDED, TO ACHIEVE APPROXIMATE FINAL SUBGRADE ELEVATION 581.5 FT., EXCLUDING AREA AROUND PIPE SUPPORTS.
7. CONTRACTOR SHALL CONSTRUCT CONCRETE PAD IN ACCORDANCE WITH THE CONTRACT DOCUMENTS (SEE DETAIL 1 ON SHEET C031).
8. CONTRACTOR SHALL PLACE 16 OZ/SY NONWOVEN GEOTEXTILE OVER THE PREPARED SUBGRADE IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS.
9. SUBGRADE SHALL BE APPROVED BY MWG AND/OR ENGINEER PRIOR TO INSTALLATION OF GEOMEMBRANE.
10. CONTRACTOR SHALL PROVIDE MEANS TO PROTECT SUBGRADE FROM EROSION, STORM WATER, AND HEAVY EQUIPMENT TRAFFIC. DAMAGE TO SUBGRADE SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE.

N

0 15 30 60

SCALE IN FEET

(APPROXIMATE)

SOURCE NOTES:

1. THIS DRAWING WAS DEVELOPED FROM DRAWING NO. 869D1-C11 REV. 7, BY HARZA ENGINEERING COMPANY, CHICAGO, ILLINOIS, DATED AUG. 1979, PROVIDED BY MIDWEST GENERATION.
2. ALSO FROM DRAWING NO. 309-1053-T BY RUETTIGER, TONELLI & ASSOCIATES, INC., JOLIET, ILLINOIS, DATED OCTOBER 5, 2009.
3. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE. PIPING AND OTHER UTILITY LOCATIONS ARE APPROXIMATE.
4. SUBGRADE CONTOURS AND POINT ELEVATIONS FROM SURVEY FILE "7017 AB LINER.DWG" DATED AUGUST 12, 2013, BY DLZ INDUSTRIAL SURVEYING, INC., JOLIET, ILLINOIS.

6.			
5.			
4.			
3.	ISSUED FOR RECORD DOCUMENTATION	07/17/14	EJT
2.	ISSUED FOR CONSTRUCTION	06/28/13	HMS
1.	ISSUED FOR BID	04/19/13	HMS
0.	ISSUED FOR PERMIT	12/20/12	HMS
REVISION:		DATE:	APP'D BY:

NATURAL
RESOURCE
TECHNOLOGY

PROJECT NO.
2113.1

DRAWN BY:
RLH 12/19/12

CHECKED BY:
RJB 12/19/12

APPROVED BY:
HMS 12/20/12

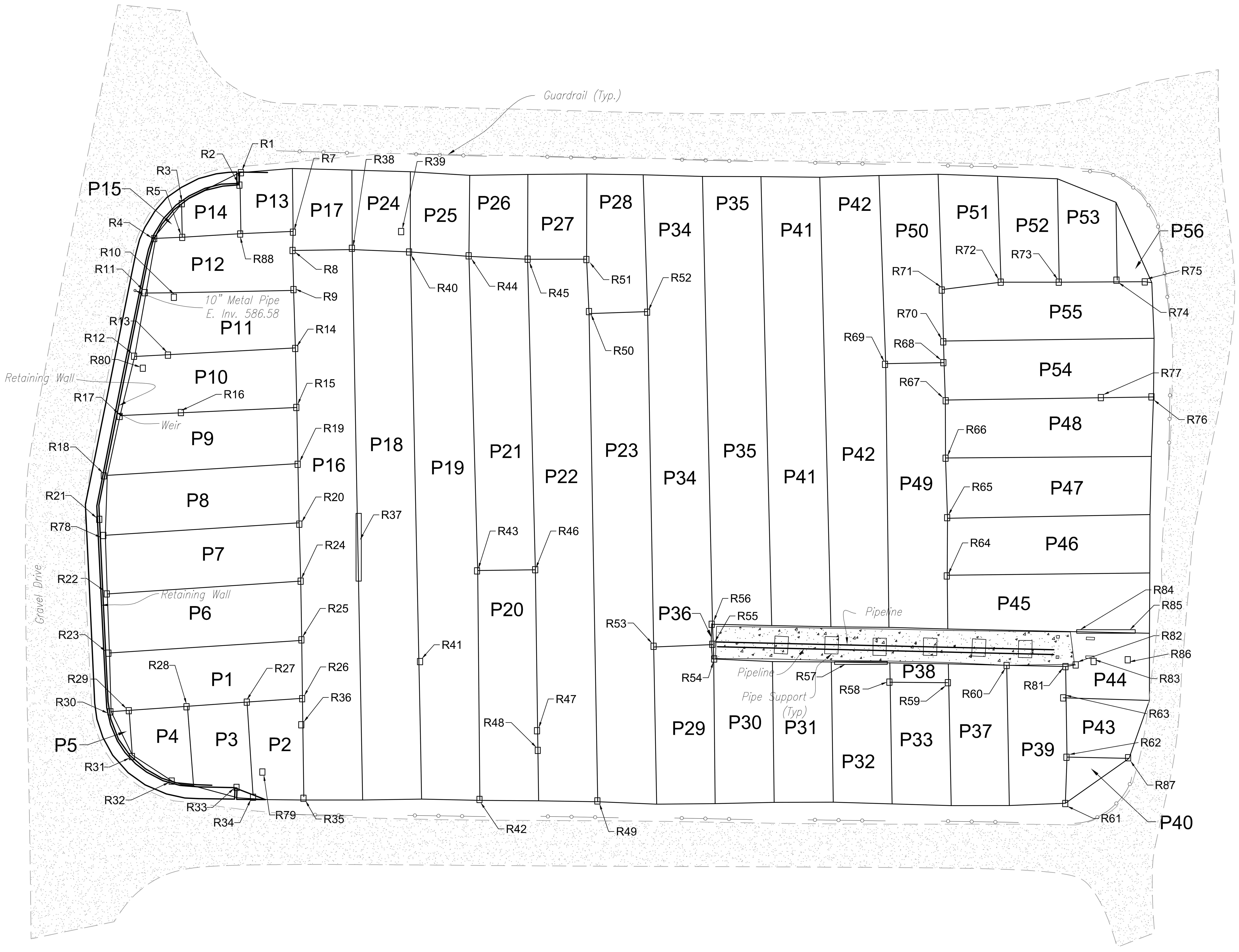
LINER SUBGRADE PREPARATION

SOUTH ASH POND 2 LINER REPLACEMENT
WILL COUNTY GENERATING STATION
MIDWEST GENERATION
ROMEOVILLE, WILL COUNTY, ILLINOIS

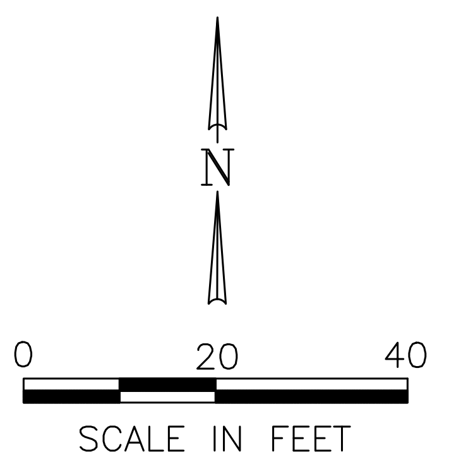
DRAWING NO: D21131C020-03

REFERENCE: .

SHEET NO.
C020



P23	GEOMEMBRANE PANEL AND PANEL NUMBER
—	GEOMEMBRANE PANEL SEAM
☐ R3	GEOMEMBRANE REPAIR LOCATION (NOT TO SCALE)
▨	CONCRETE
-o-	GUARD RAIL
▨	GRAVEL DRIVE



SOURCE:
1. THIS FIGURE WAS DEVELOPED FROM SURVEY FILE 7017 AB LINER.dwg, DATED AUGUST 12, 2013, BY DLZ INDUSTRIAL SURVEYING, INC., JOLIET, ILLINOIS.

6.			
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0.	ISSUED FOR RECORD DOCUMENTATION	07/17/14	EJT
REVISION:		DATE:	APP'D BY:

NATURAL
RESOURCE
TECHNOLOGY

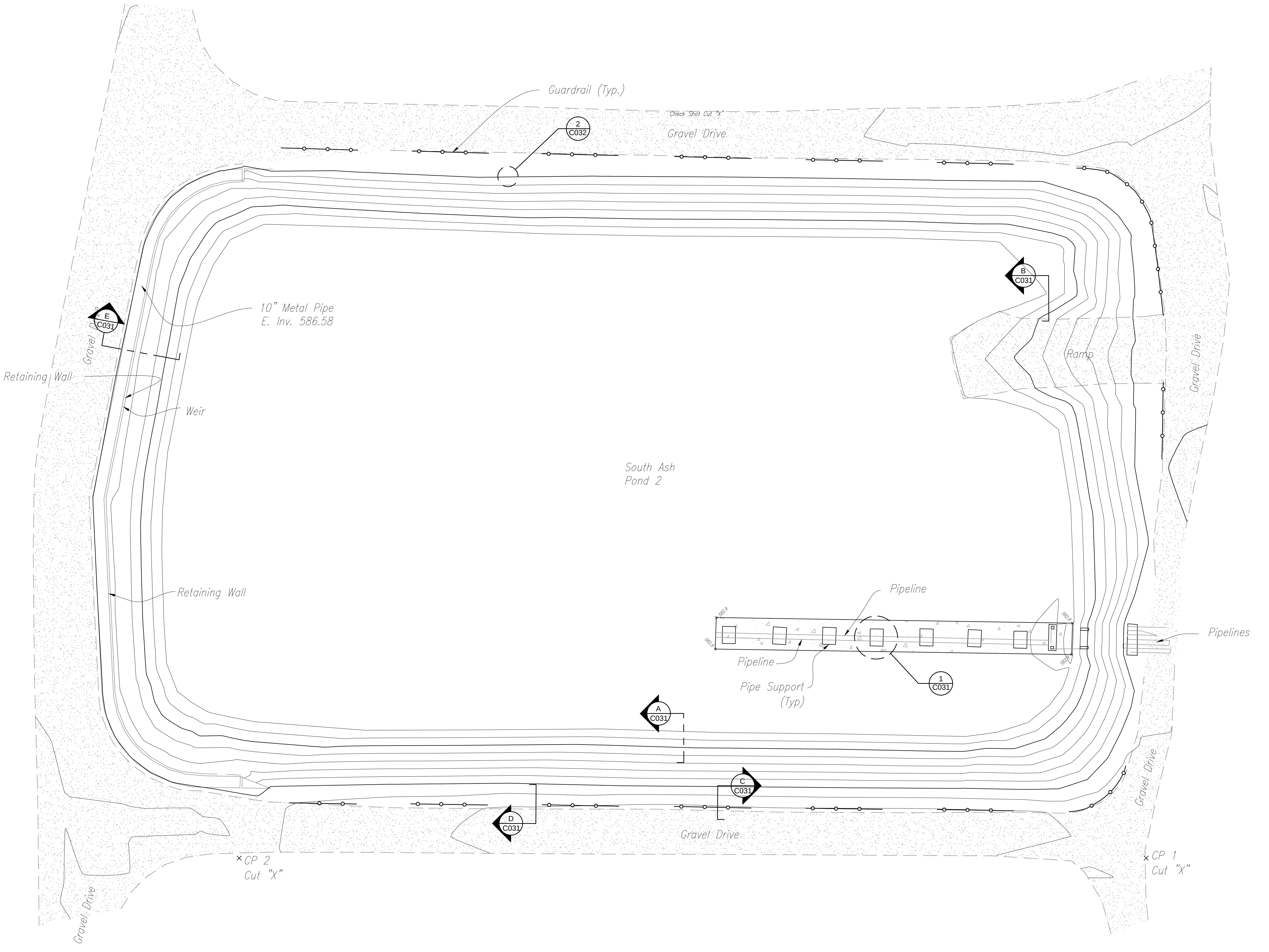
PROJECT NO.
2113.1
DRAWN BY:
RLH 11/22/13
CHECKED BY:
JRR 01/28/14
APPROVED BY:
EJT 07/17/14

GEOMEMBRANE PANEL LAYOUT

SOUTH ASH POND 2 LINER REPLACEMENT
WILL COUNTY GENERATING STATION
MIDWEST GENERATION
ROMEOVILLE, WILL COUNTY, ILLINOIS

DRAWING NO: D21131C021-00
REFERENCE: .

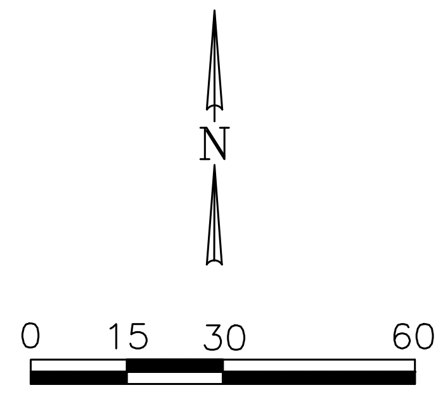
SHEET NO.
C021



—— ——	ABOVEGROUND INLET PIPE
———	UNDERGROUND DISCHARGE PIPE
— OEL —	OVERHEAD ELECTRIC LINE
━━━	ANCHOR TRENCH
—o—o—	GUARD RAIL
●	MARKER POST LOCATION
▨	CONCRETE
▥	~~WARNING LAYER~~
▩	~~GEOCELL~~
▦	GRAVEL DRIVE

CONTRACTOR NOTES: △ COMPLETED DURING CONSTRUCTION

1. CONTRACTOR SHALL INSTALL 60 MIL HDPE, WHITE, TEXTURED GEOMEMBRANE IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS PRIOR TO PLACEMENT OF THE CUSHION AND WARNING LAYERS. CONTRACTOR SHALL PROVIDE AND FOLLOW AN APPROVED GEOMEMBRANE LAYOUT PLAN.
2. GEOMEMBRANE SHALL BE ANCHORED INTO 2.5 FEET DEEP TRENCHES ALONG TOP OF POND BANK, AS SHOWN ON SHEET C031. CONTRACTOR SHALL ADVISE MWG AND/OR ENGINEER IF PROPOSED LOCATION FOR ANCHOR TRENCH IS NOT POSSIBLE.
3. CONTRACTOR SHALL PLACE 16 OZ/SY NONWOVEN GEOTEXTILE OVER THE GEOMEMBRANE FOLLOWING ENGINEER APPROVAL AND PASSING QUALITY CONTROL RESULTS IN ACCORDANCE WITH TECHNICAL SPECIFICATIONS (SEE SHEET C031).
4. GEOCELL SHALL BE INSTALLED ALONG SIDE SLOPES IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS AND MANUFACTURER'S RECOMMENDATIONS (SEE SHEET C032). NO VEHICULAR TRAFFIC IS ALLOWED ON THE GEOCELL PRIOR TO INFILL.
5. CUSHION MATERIAL AND WARNING LAYER MATERIAL SHALL BE PLACED AT THE BASE OF POND IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS (SEE SHEET C031).
6. RESTORE AREAS DISTURBED BY EQUIPMENT AND MATERIAL LAYDOWN.
7. CONTRACTOR SHALL PROVIDE SURVEY DOCUMENTATION OF THE ITEMS LISTED IN THE TECHNICAL SPECIFICATIONS.
8. CONTRACTOR SHALL PERFORM A LEAK LOCATION SURVEY IN ACCORDANCE WITH TECHNICAL SPECIFICATIONS FOLLOWING PLACEMENT OF GEOCELL, CUSHION, AND WARNING LAYERS.
9. CONTRACTOR SHALL INSTALL GUARDRAILS ALONG TOP OF SLOPE EVERY 20 FEET AS SHOWN (SEE DETAIL ON SHEET C031) AND IN ACCORDANCE WITH MANUFACTURER'S REQUIREMENTS/INSTRUCTIONS AS APPROVED BY MWG AND/OR ENGINEER.



SCALE IN FEET
(APPROXIMATE)

SOURCE NOTES:

1. THIS DRAWING WAS DEVELOPED FROM DRAWING NO. 7017AB2, BY DLZ INDUSTRIAL, LLC BURNS HARBOR, INDIANA, DATED AUGUST 12 2013, PROVIDED BY BREISER CONSTRUCTION CO. FINAL ELEVATIONS SURVEYED SEPTEMBER 6, 2013.

6.			
5.			
4.			
3.	ISSUED FOR RECORD DOCUMENTATION	07/17/14	EJT
2.	ISSUED FOR CONSTRUCTION	06/28/13	HMS
1.	ISSUED FOR BID	05/03/13	HMS
0.	ISSUED FOR PERMIT	12/20/12	HMS
REVISION:		DATE:	APP'D BY:

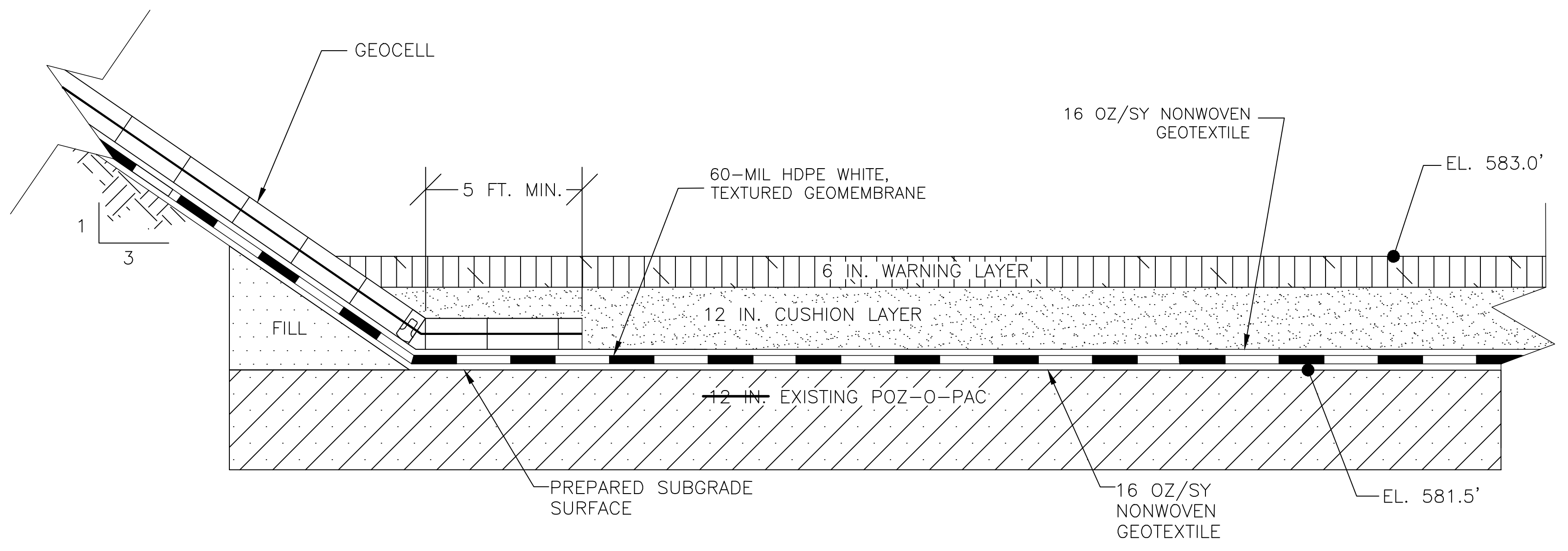
NATURAL
RESOURCE
TECHNOLOGY

PROJECT NO. 2113.1
DRAWN BY: RLH 12/19/12
CHECKED BY: RJB 12/19/12
APPROVED BY: HMS 12/20/12

GEOCELL AND WARNING LAYER PLAN

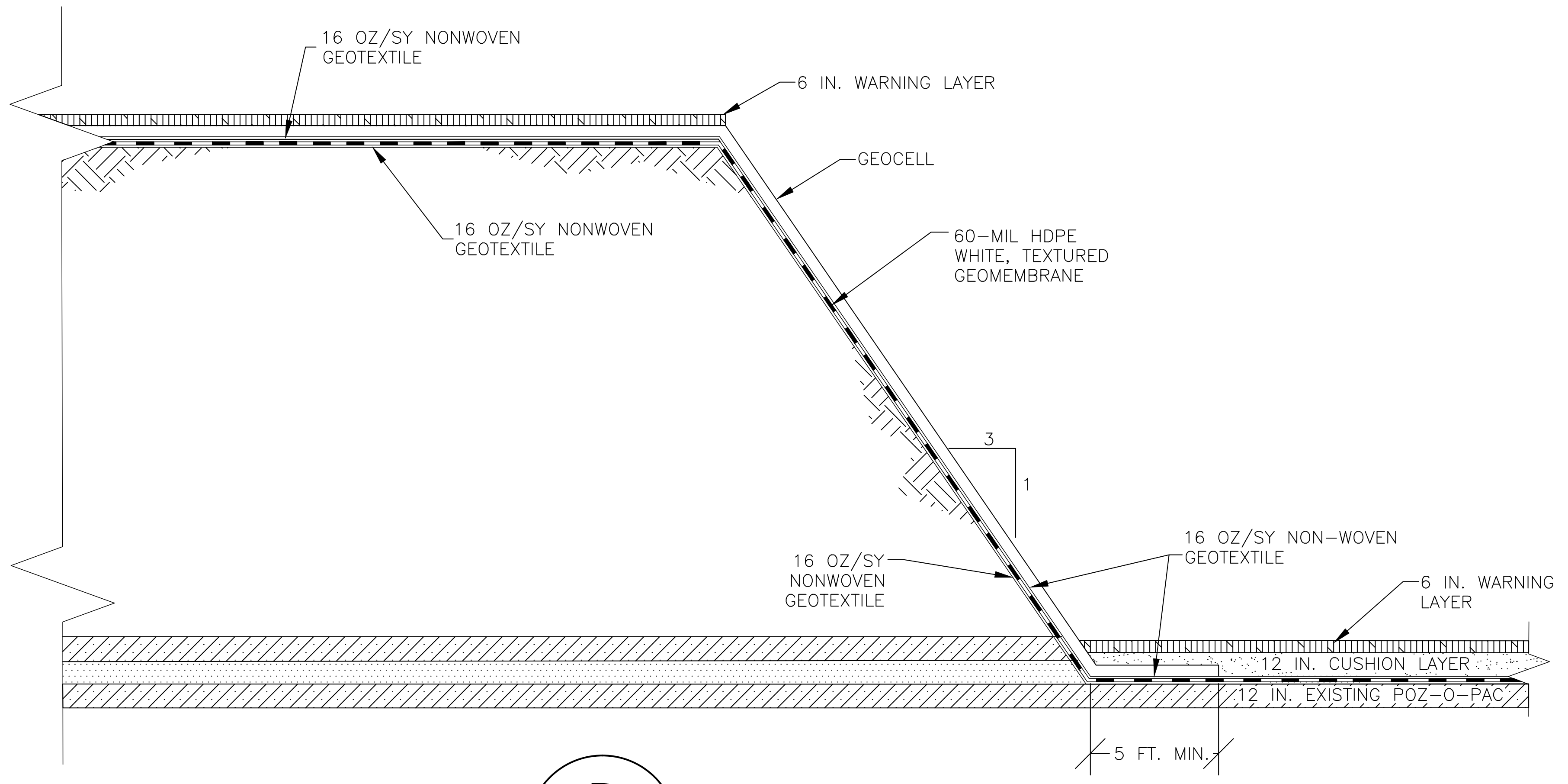
SOUTH ASH POND 2 LINER REPLACEMENT
WILL COUNTY GENERATING STATION
MIDWEST GENERATION
ROMEOVILLE, WILL COUNTY, ILLINOIS

DRAWING NO: D21131C030-02
REFERENCE: .
SHEET NO. C030

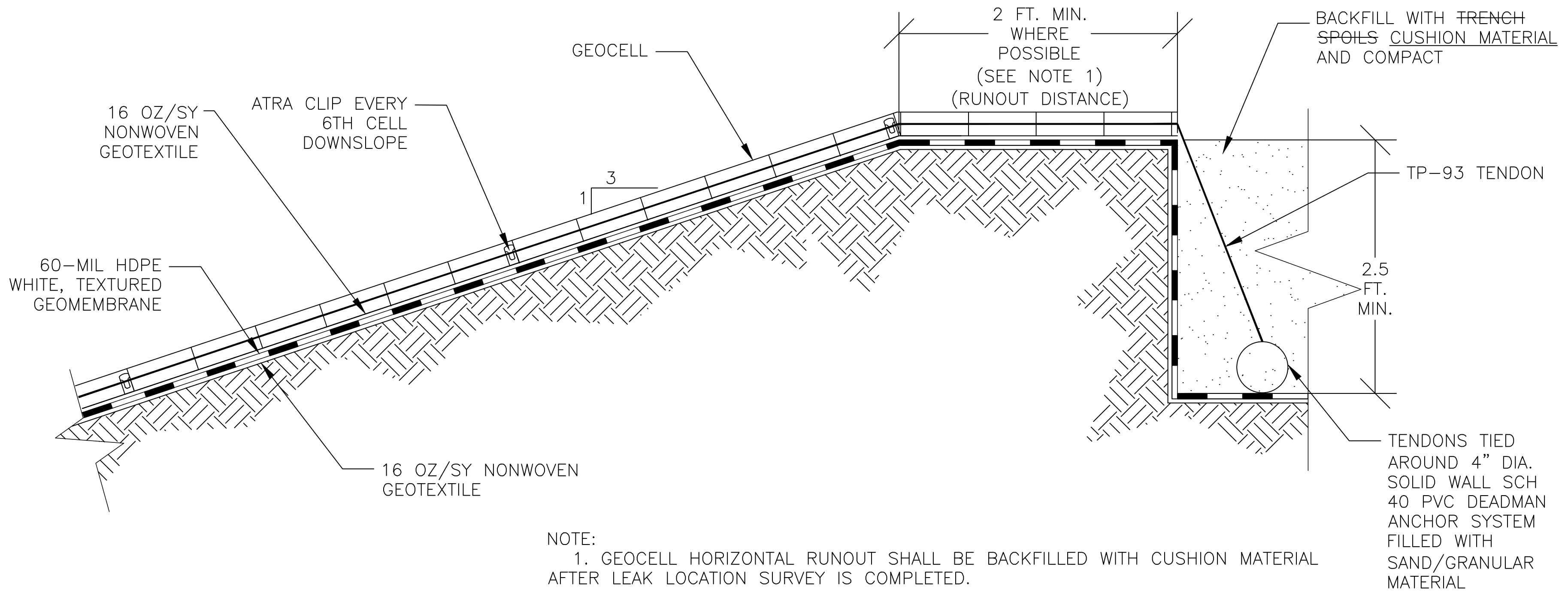


NOTE:
1. GEOMEMBRANE SEAMS SHALL BE PLACED MINIMUM 5 FT. FROM TOE OF SLOPE.

A / C030 SLOPE TRANSITION SECTION
NOT TO SCALE

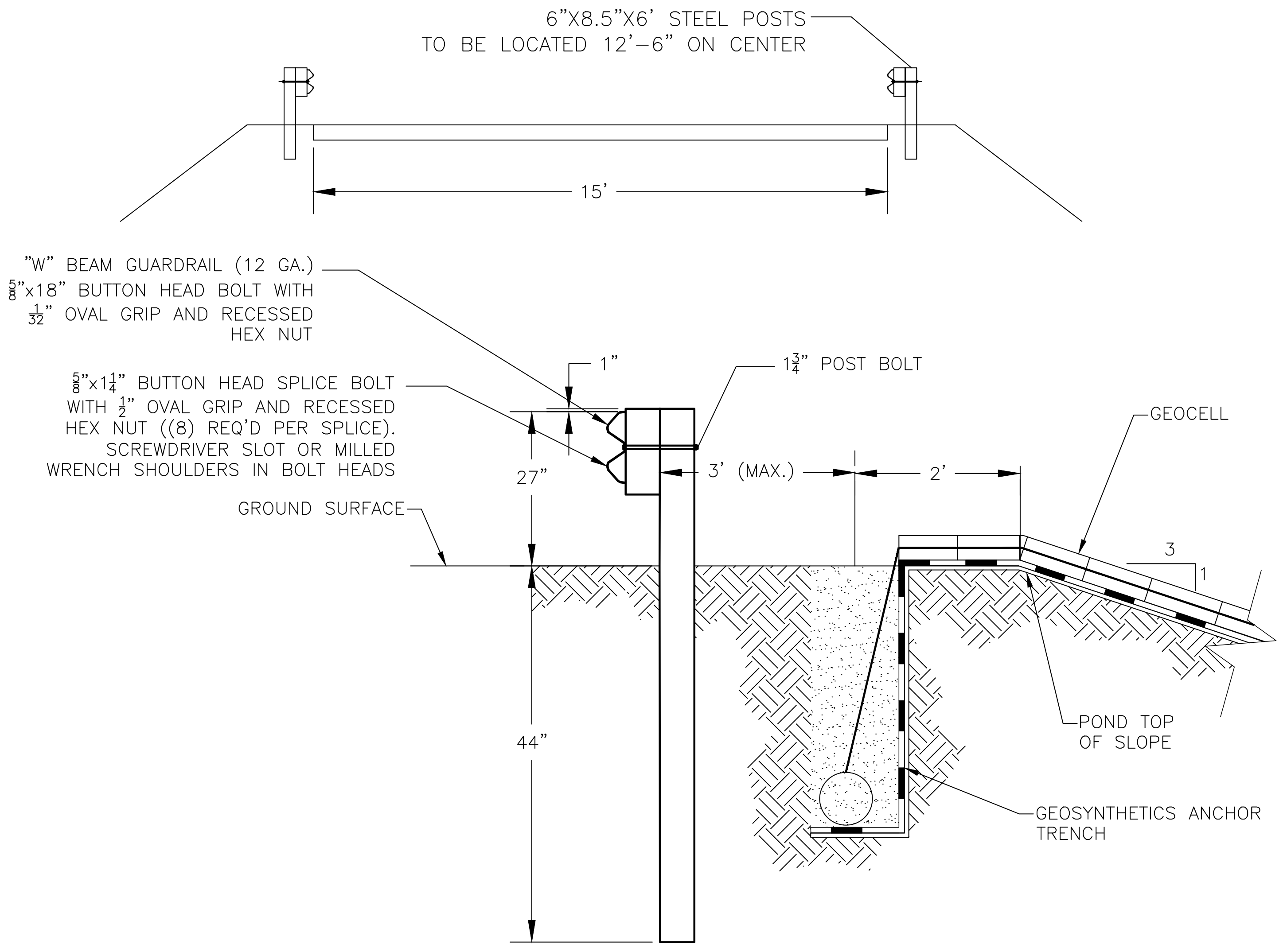


B / C030 RAMP SECTION
NOT TO SCALE

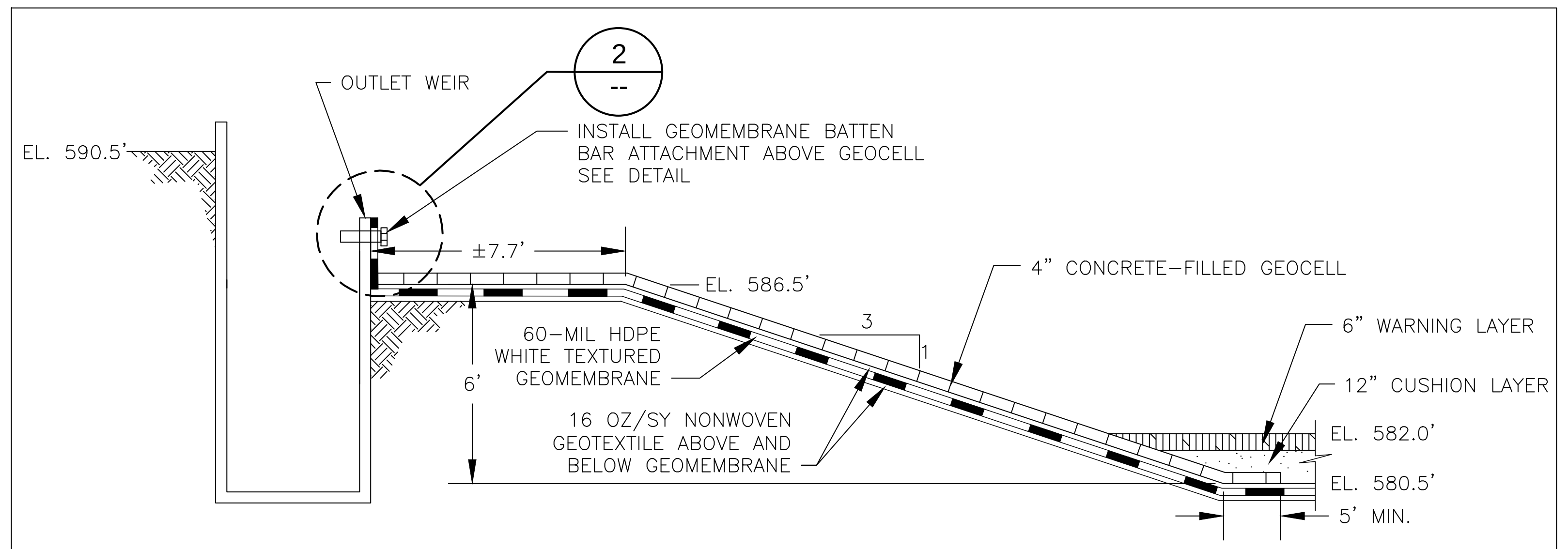


NOTE:
1. GEOCELL HORIZONTAL RUNOUT SHALL BE BACKFILLED WITH CUSHION MATERIAL AFTER LEAK LOCATION SURVEY IS COMPLETED.

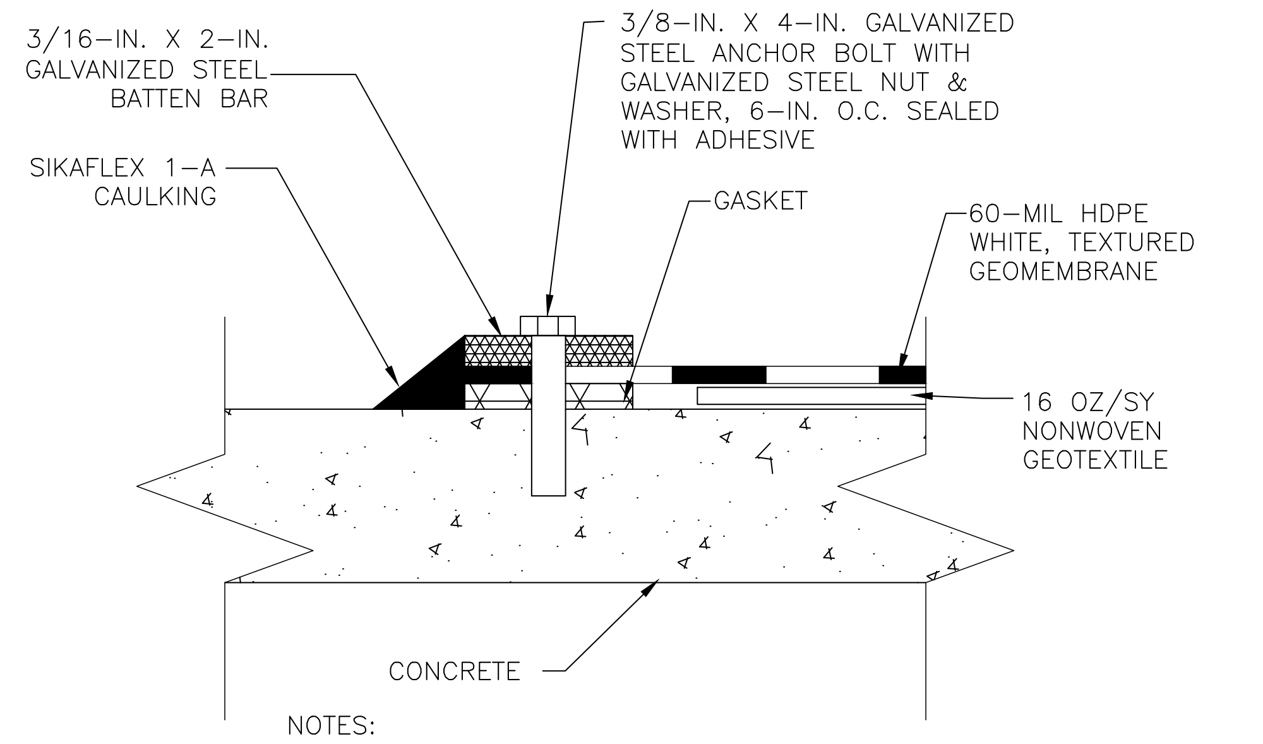
C / C030 ANCHOR TRENCH SECTION
NOT TO SCALE



D / C030 GUARDRAIL SECTION
NOT TO SCALE

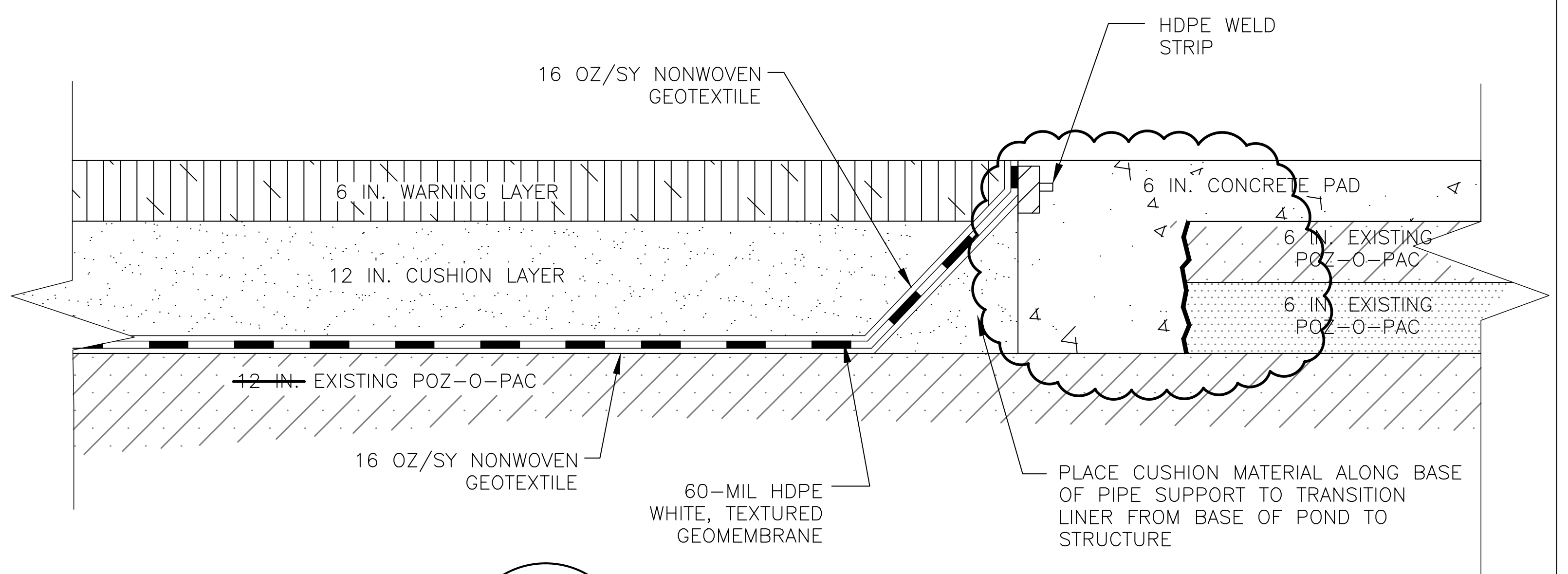


E / C030 WEIR AND GEOCELL SECTION
NOT TO SCALE



NOTES:
1. ANCHOR BOLTS 6 IN. ON CENTER.

2 / -- BATTEN BAR ATTACHMENT
NOT TO SCALE



1 / C020 C030 CONCRETE PAD DETAIL
NOT TO SCALE

REVISION:		DATE:	APP'D BY:
6.			
5.			
4.			
3.	ISSUED FOR RECORD DOCUMENTATION	07/17/14	EJT
2.	ISSUED FOR CONSTRUCTION	07/01/13	HMS
1.	ISSUED FOR BID	05/03/13	HMS
0.	ISSUED FOR PERMIT	12/20/12	HMS

NATURAL
RESOURCE
TECHNOLOGY

PROJECT NO. 2113.1
DRAWN BY: RLH 12/19/12
CHECKED BY: RJB 12/19/12
APPROVED BY: HMS 12/20/12

DETAILS AND SECTIONS
SOUTH ASH POND 2 LINER REPLACEMENT
WILL COUNTY GENERATING STATION
MIDWEST GENERATION
ROMEOVILLE, WILL COUNTY, ILLINOIS

DRAWING NO: D21131C031-03
REFERENCE: .
SHEET NO. C031

Jul 17, 2014 1:27pm PLOTTED BY: dduda SAVED BY: dduda
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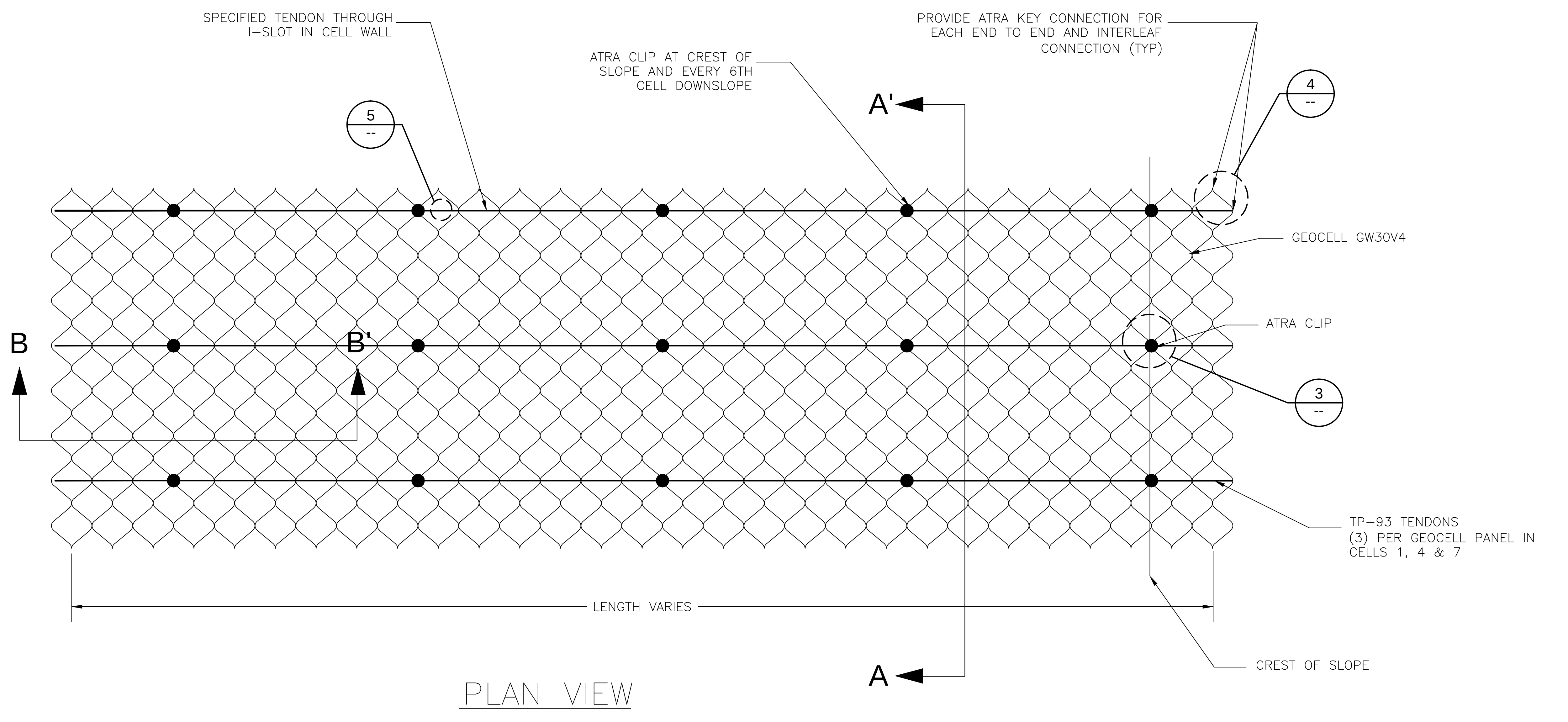
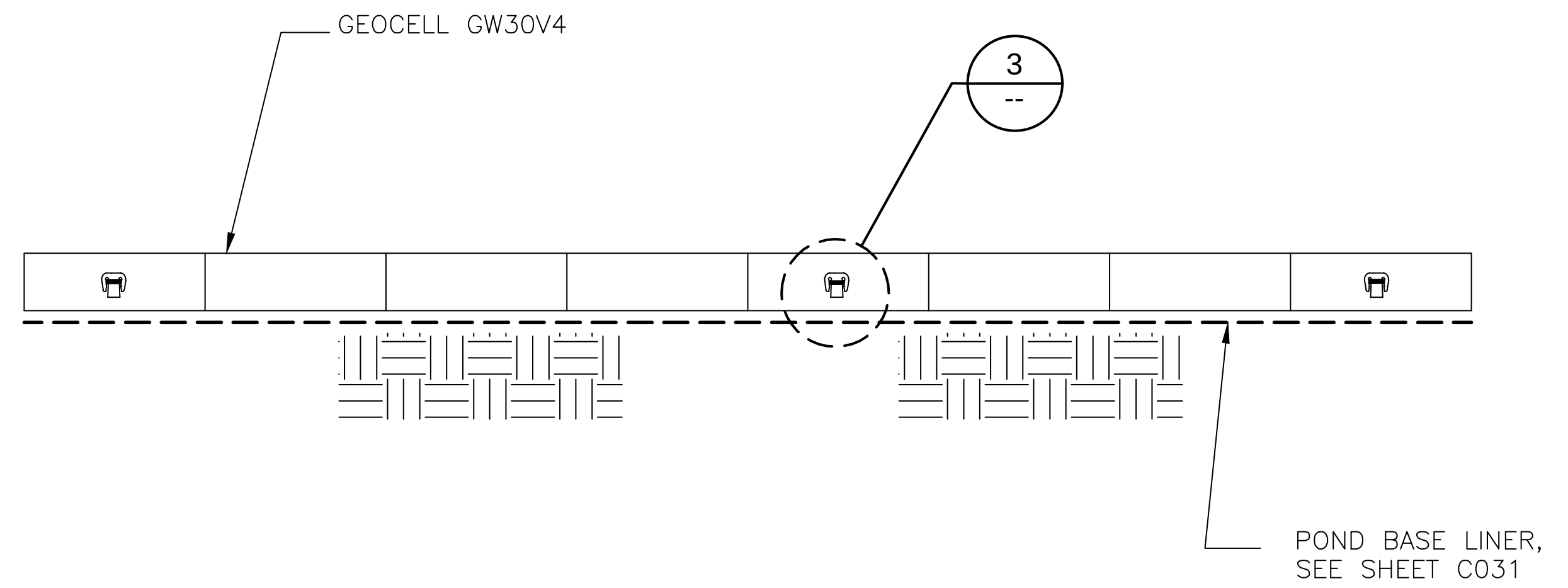
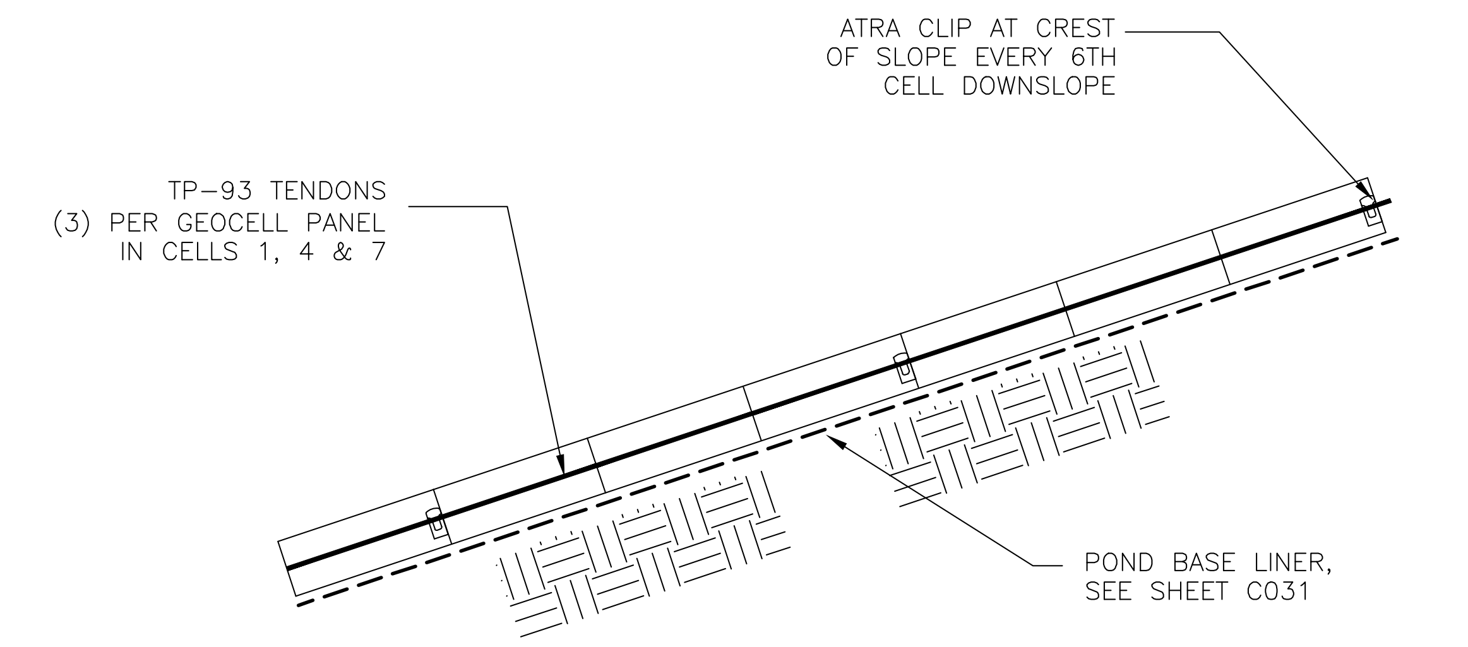
XREFS:



PLAN VIEW



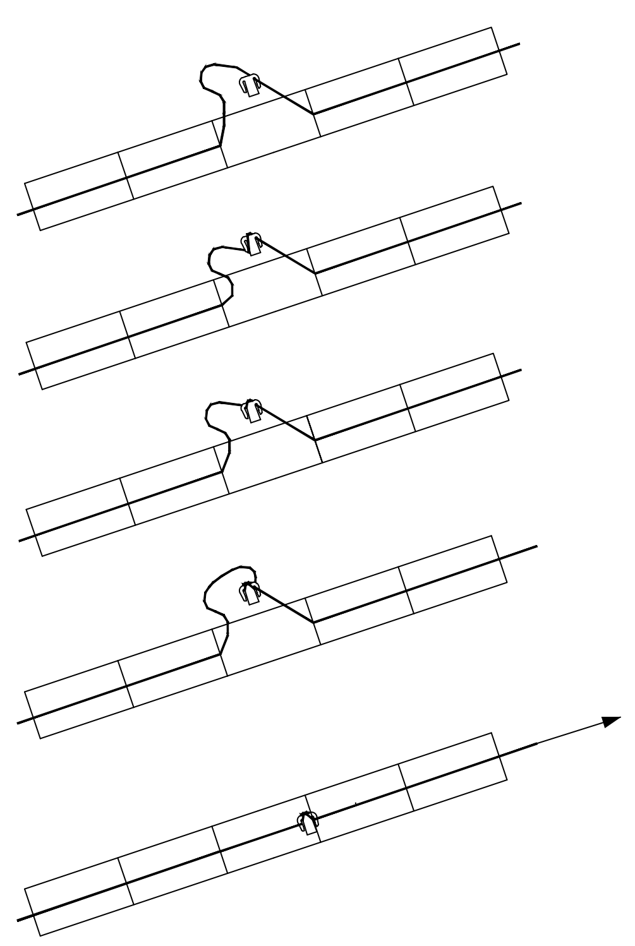
SECTION A–A'



SECTION B–B'

2 / C030 GEOCELL PANEL AND CONNECTIONS DETAIL

NOT TO SCALE



STEPS:

1. PLACE THE TENDON UNDER THE ARM OF THE ATRA CLIP.
2. DIAGONALLY CROSS THE TENDON OVER THE TOP OF THE ATRA CLIP.
3. PLACE THE TENDON UNDER THE OTHER ARM AND PULL TIGHT TO REMOVE SLACK.
4. DIAGONALLY CROSS THE TENDON BACK OVER THE TOP OF THE ATRA CLIP AND PLACE TENDON UNDER THE FIRST ARM.
5. PULL THE TENDON TIGHT TO REMOVE SLACK.
6. ATRA CLIP SHALL BE TIGHT AGAINST THE UPPER CELL WALL AFTER SECURING.
7. PULL TENDON TIGHT AT LOCATION OF NEXT ATRA CLIP.

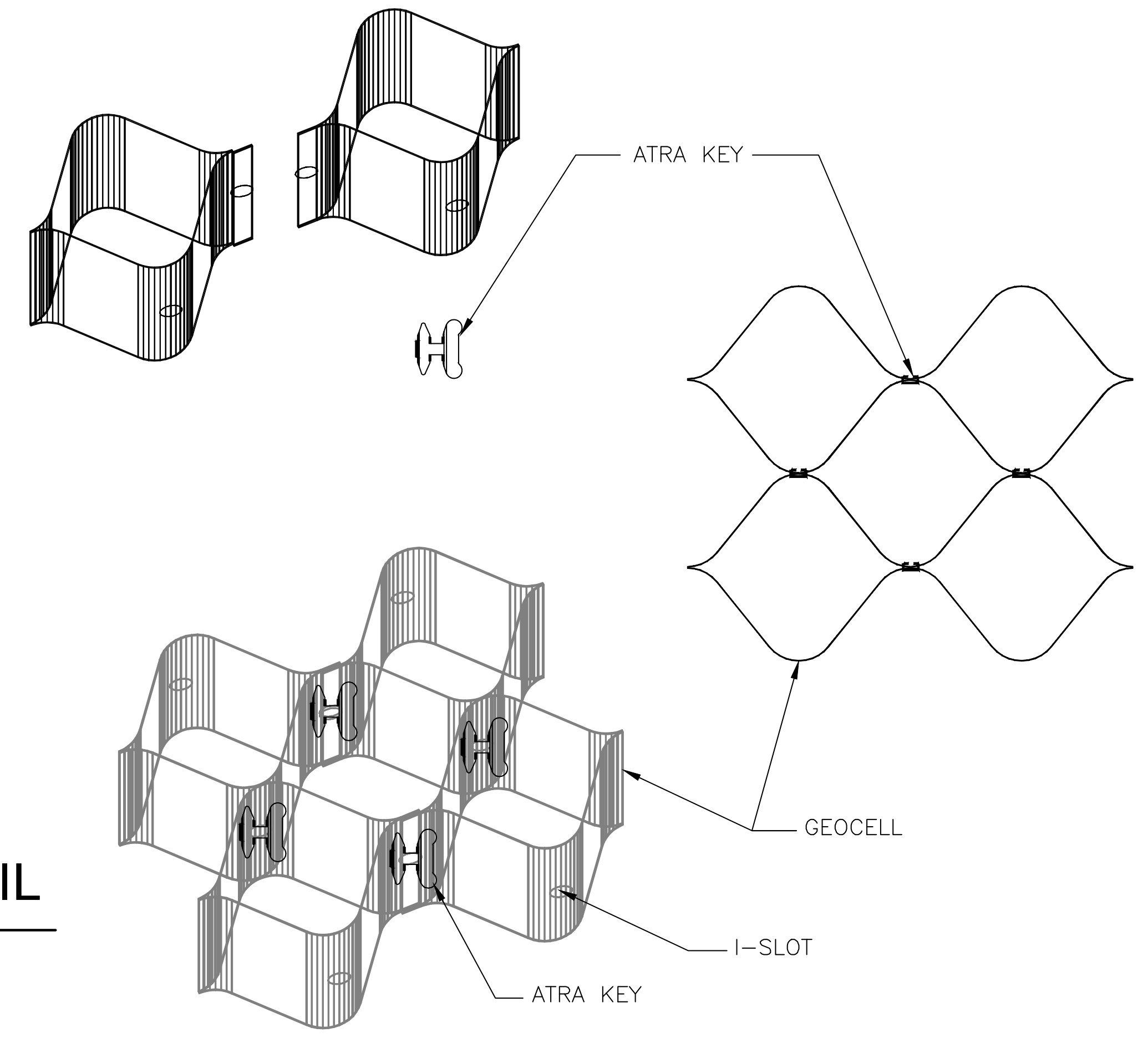
3 / -- ATRA® CLIP INSTALLATION DETAIL

NOT TO SCALE

ATRA KEY® CONNECTION DETAILS

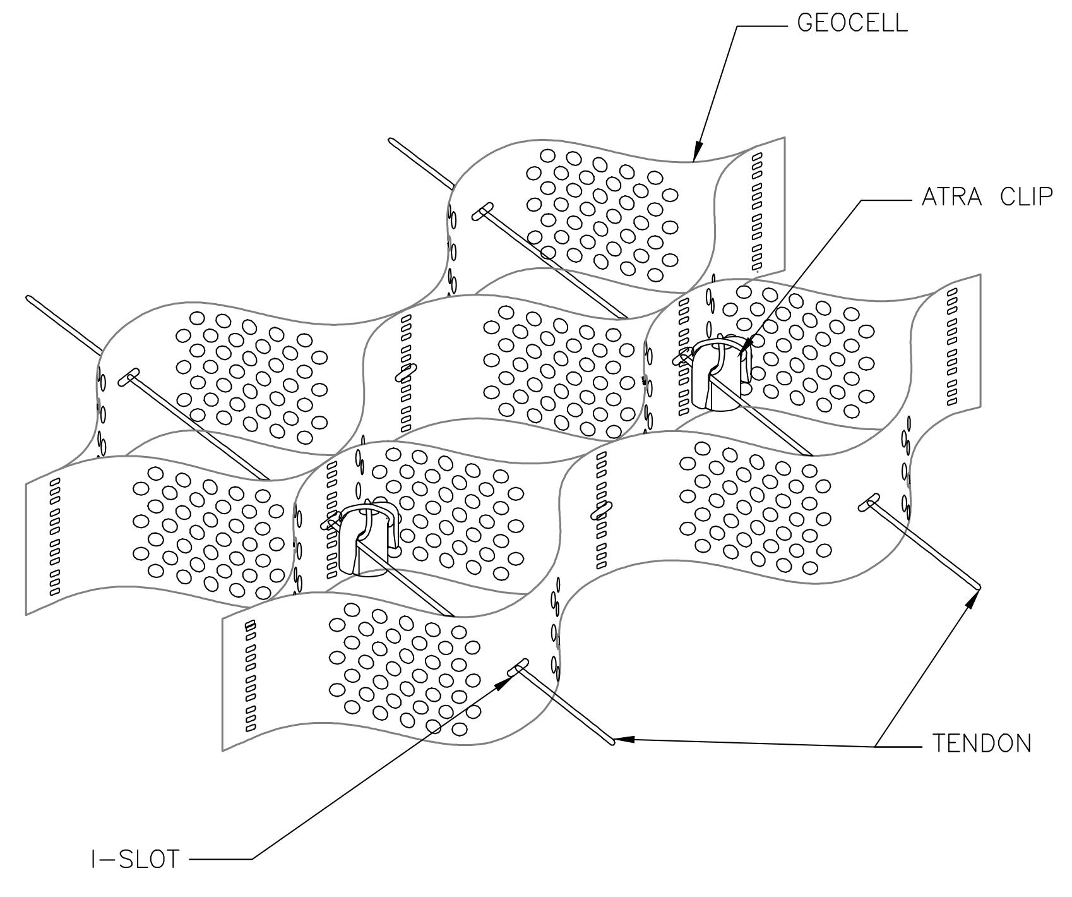
GEOCELL CONNECTION NOTES:

1. THE TOP EDGES OF ADJACENT CELL WALLS SHALL BE FLUSH WHEN CONNECTING.
2. ALIGN THE I-SLOTS FOR INTERLEAF AND END TO END CONNECTIONS.
3. THE GEOCELL PANELS SHALL BE CONNECTED WITH ATRA KEYS AT EACH INTERLEAF AND END TO END CONNECTION.



4 / -- GEOCELL SIDE AND END CONNECTION DETAIL

NOT TO SCALE



5 / -- TENDON DETAIL

NOT TO SCALE

6.			
5.			
4.			
3.	ISSUED FOR RECORD DOCUMENTATION	07/03/14	EJT
2.	ISSUED FOR CONSTRUCTION	06/28/13	HMS
1.	ISSUED FOR BID	04/19/13	HMS
0.	ISSUED FOR PERMIT	12/20/12	HMS
REVISION:		DATE:	APP'D BY:

NATURAL RESOURCE TECHNOLOGY

PROJECT NO. 2113.1
DRAWN BY: RLH 12/13/12
CHECKED BY: RJB 12/13/12
APPROVED BY: HMS 12/20/12

GEOCELL DETAILS AND SECTIONS

SOUTH ASH POND 2 LINER REPLACEMENT
WILL COUNTY GENERATING STATION
MIDWEST GENERATION
ROMEOVILLE, WILL COUNTY, ILLINOIS

DRAWING NO: D21131C032-03
REFERENCE: .
SHEET NO. C032

Jul 17, 2014 1:29pm PLOTTED BY: dduda SAVED BY: dduda
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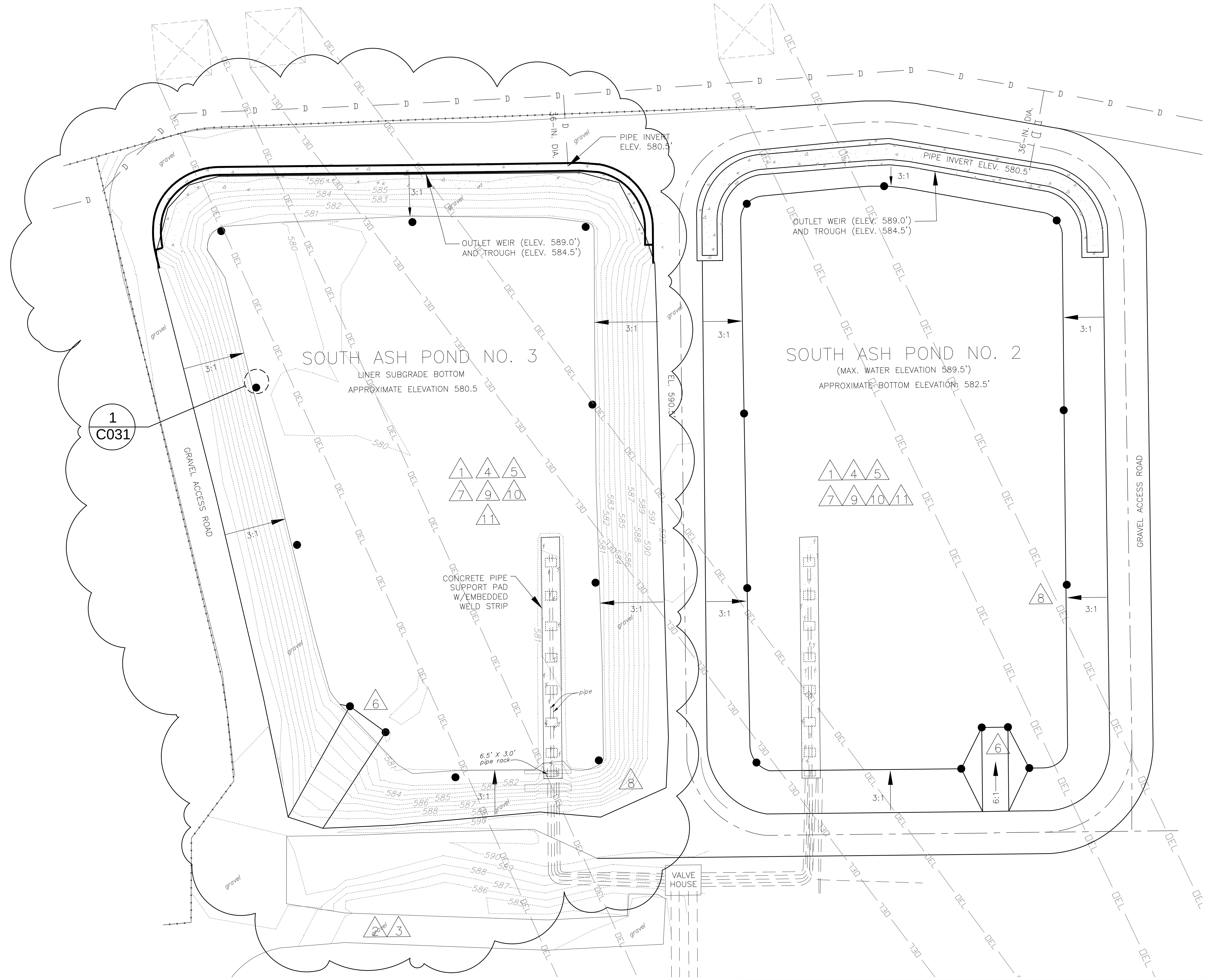
XREFS:

Attachment 1-3 – Liner Replacement Drawings for Pond 3S



LEGEND

583	EXISTING CONTOUR
— — —	ABOVEGROUND INLET PIPE
	EXISTING FENCE
— D —	UNDERGROUND DISCHARGE PIPING
— DEL —	OVERHEAD ELECTRIC LINE
●	MARKER POST LOCATION
▨	CONCRETE
MWG	MIDWEST GENERATION, LLC
☁	RECORD DOCUMENTATION

CONTRACTOR NOTES: △

1. CONTRACTOR SHALL BEGIN CONSTRUCTION SEQUENCE WITH SOUTH ASH POND NO. 3.
2. CONTRACTOR SHALL STORE ALL GEOSYNTHETICS AND SUBGRADE MATERIALS IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS.
3. CONTRACTOR SHALL STORE AND STAGE EQUIPMENT AT LOCATION APPROVED BY MIDWEST GENERATION.
4. PROTECT ALL CONCRETE AND UTILITY STRUCTURES THROUGHOUT PROJECT DURATION.
5. CONTRACTOR SHALL REMOVE ALL VEGETATION, ROCKS, AND OTHER DEBRIS GREATER THAN 3 INCHES IN SIZE FROM POND SUBGRADE AND DISPOSE OF IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS.
6. CONTRACTOR SHALL CLEAN OFF THE RAMP CONCRETE SURFACE TO THE EXTENT PRACTICAL TO REMOVE ROCKS THAT MAY POSE A HAZARD TO GEOMEMBRANE, AS APPROVED BY GEOMEMBRANE INSTALLER, ENGINEER AND/OR MWG.
7. CONTRACTOR SHALL REMOVE ENTIRE LAYER OF EXISTING POZ-O-PAC LINER FROM THE BASE OF THE ASH PONDS AND 6 INCHES OF EXISTING FILL MATERIAL BELOW THE LINER, EXCLUDING AREA AROUND PIPE SUPPORTS AS NEEDED TO ACHIEVE FINAL SUBGRADE ELEVATION 581 FT. LOWER LAYER OF POZ-O-PAC SHALL REMAIN IN PLACE.
8. CONTRACTOR SHALL INSTALL MARKER POSTS ALONG THE BASE OF THE ASH PONDS AS SHOWN AND IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS.
9. CONTRACTOR SHALL PLACE 16 OZ. NONWOVEN GEOTEXTILE OVER THE PREPARED SUBGRADE IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS.
10. SUBGRADE SHALL BE APPROVED BY MWG AND/OR ENGINEER PRIOR TO INSTALLATION OF GEOMEMBRANE.
11. CONTRACTOR SHALL PROVIDE MEANS TO PROTECT SUBGRADE FROM EROSION, STORM WATER, AND HEAVY EQUIPMENT TRAFFIC. DAMAGE TO SUBGRADE SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE.

N

0 15 30 60

SCALE IN FEET

(APPROXIMATE)

SOURCE:
THIS DRAWING WAS DEVELOPED FROM DRAWING NO. 869D1-C11 REV. 7, BY HARZA ENGINEERING COMPANY, CHICAGO, ILLINOIS, DATED AUG. 1979, PROVIDED BY MIDWEST GENERATION.
ALSO FROM DRAWING NO. 309-1053-T BY RUETTINGER, TONELLI AND ASSOCIATES, INC., JOLIET, ILLINOIS, DATED OCTOBER 5, 2009.
ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE. PIPING AND OTHER UTILITY LOCATIONS ARE APPROXIMATE.

6.			
5.			
4.			
3.	RECORD DOCUMENTATION FOR SOUTH ASH POND 3	12/30/09	HMS
2.	ISSUED FOR CONSTRUCTION	08/28/09	HMS
1.	ISSUED FOR BID	08/20/08	HMS
0.	ISSUED FOR PERMIT	07/15/08	HMS
REVISION:		DATE:	APP'D BY:

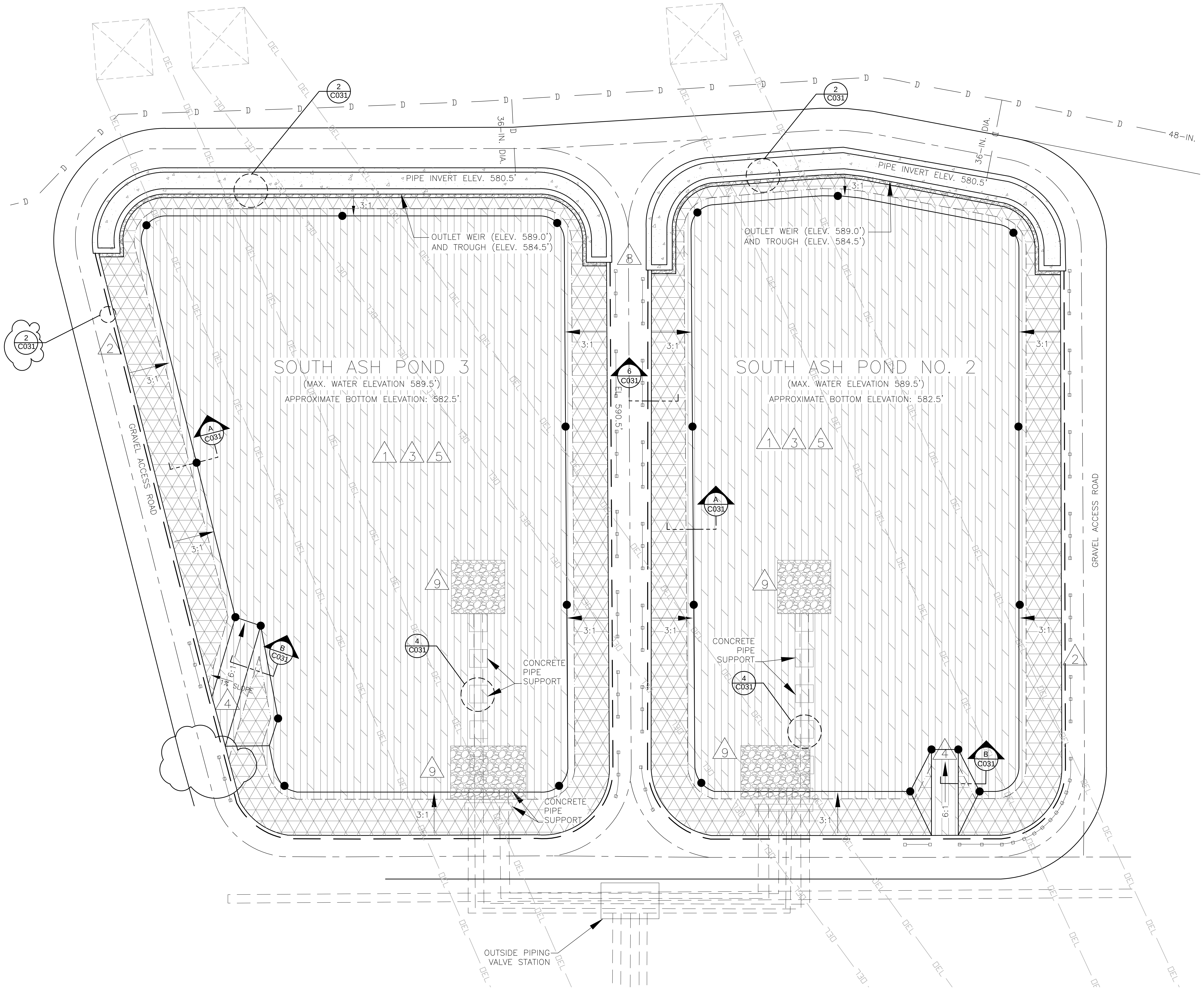
NATURAL RESOURCE TECHNOLOGY

PROJECT NO. 1900
DRAWN BY: RLH/KNW 6/23/08
CHECKED BY: EJT 6/23/08
APPROVED BY: HMS 7/15/08

LINER SUBGRADE PREPARATION

SOUTH ASH POND LINER REPLACEMENT
MIDWEST GENERATION
WILL COUNTY GENERATING STATION
ROMEOVILLE, ILLINOIS

DRAWING NO: D1900C020-03
REFERENCE: \bids-con
SHEET NO. C020



CONTRACTOR NOTES: △

1. CONTRACTOR SHALL INSTALL 60 MIL HDPE, WHITE, TEXTURED GEOMEMBRANE IN ACCORDANCE WITH THE TECHNICAL SPECIFICATION PRIOR TO PLACEMENT OF THE WARNING LAYER. CONTRACTOR SHALL PROVIDE AND FOLLOW AN APPROVED GEOMEMBRANE LAYOUT PLAN.
2. GEOMEMBRANE SHALL BE ANCHORED INTO 2.5 FEET DEEP TRENCHES ALONG TOP OF POND BANK, AS SHOWN ON SHEET C031. CONTRACTOR SHALL ADVISE MWG AND/OR ENGINEER IF PROPOSED LOCATION FOR ANCHOR TRENCH IS NOT POSSIBLE.
3. CONTRACTOR SHALL PLACE 12-OZ. NON-WOVEN GEOTEXTILE, CUSHION MATERIAL AND WARNING LAYER MATERIAL OVER THE GEOMEMBRANE AT BASE AND 4 FEET ON SIDE SLOPES FOLLOWING ENGINEER APPROVAL AND PASSING QUALITY CONTROL RESULTS IN ACCORDANCE WITH TECHNICAL SPECIFICATIONS (SEE SHEET C031).
4. CONTRACTOR SHALL PLACE 2 LAYERS OF 12-OZ. NONWOVEN GEOTEXTILE, CUSHION AND WARNING LAYER MATERIALS OVER THE GEOMEMBRANE ON THE RAMP, AS SHOWN ON SHEET C031.
5. RESTORE AREAS DISTURBED BY EQUIPMENT AND MATERIAL LAYDOWN.
6. CONTRACTOR SHALL PROVIDE SURVEY DOCUMENTATION OF THE ITEMS LISTED IN THE TECHNICAL SPECIFICATIONS.
7. CONTRACTOR SHALL PERFORM A LEAK LOCATION SURVEY IN ACCORDANCE WITH TECHNICAL SPECIFICATIONS.
8. CONTRACTOR SHALL INSTALL GUARDRAILS ALONG TOP OF SLOPE EVERY 20 FEET AS SHOWN (SEE DETAIL ON SHEET C031) AND IN ACCORDANCE WITH MANUFACTURER'S REQUIREMENTS/INSTRUCTIONS AS APPROVED BY MWG AND/OR ENGINEER.
9. CONTRACTOR SHALL PLACE RIPRAP 18 INCHES THICK, AT PIPE OUTFALLS ABOVE CUSHION LAYER AND OVER 12-OZ. NON-WOVEN GEOTEXTILE.

LEGEND

— — — —	ABOVEGROUND INLET PIPE
— D —	UNDERGROUND DISCHARGE PIPE
— DEL —	OVERHEAD ELECTRIC LINE
—— ——	ANCHOR TRENCH
— - — - —	12 OZ. NON-WOVEN GEOTEXTILE
—○—○—	GUARD RAIL
●	MARKER POST LOCATION
▭	CONCRETE
▥	WARNING LAYER
▩	HDPE GEOMEMBRANE
▨	RIPRAP

N

0 15 30 60

SCALE IN FEET
(APPROXIMATE)

SOURCE:
THIS DRAWING WAS DEVELOPED FROM DRAWING NO. 869D1-C11 REV. 7, BY HARZA ENGINEERING COMPNAY, CHICAGO, ILLINOIS, DATED AUG. 1979, PROVIDED BY MIDWEST GENERATION.
ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE. PIPING AND OTHER UTILITY LOCATIONS ARE APPROXIMATE.

REVISION:		DATE:	APP'D BY:
6.			
5.			
4.	ASBUILT	.	.
3.	ISSUED FOR CONSTRUCTION	08/28/09	HMS
2.	ADDENDUM NO. 1	09/15/08	HMS
1.	ISSUED FOR BID	08/20/08	HMS
0.	ISSUED FOR PERMIT	07/15/08	HMS

NATURAL
RESOURCE
TECHNOLOGY

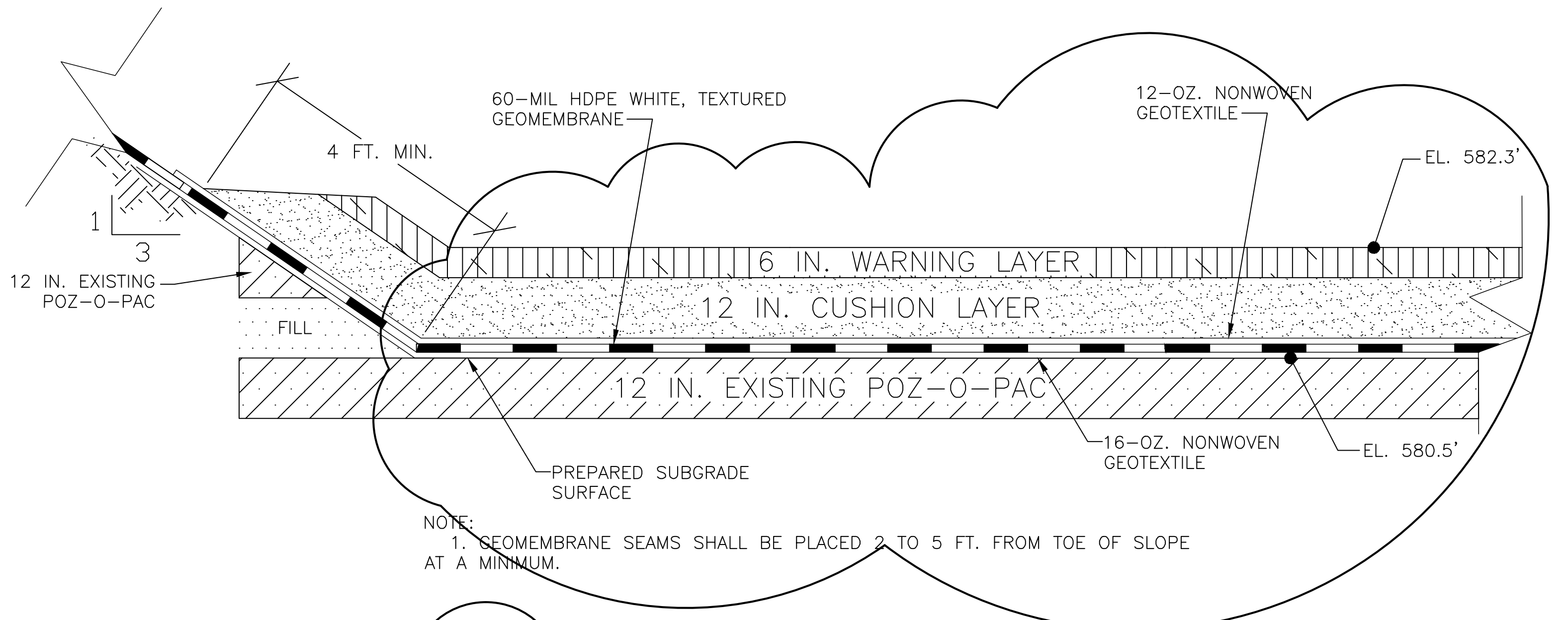
PROJECT NO.
1900
DRAWN BY:
RLH/KNW 11/30/09
CHECKED BY:
RJG 11/30/09
APPROVED BY:
.

WARNING LAYER PLAN

SOUTH ASH POND LINER REPLACEMENT
MIDWEST GENERATION
WILL COUNTY GENERATING STATION
ROMEOVILLE, ILLINOIS

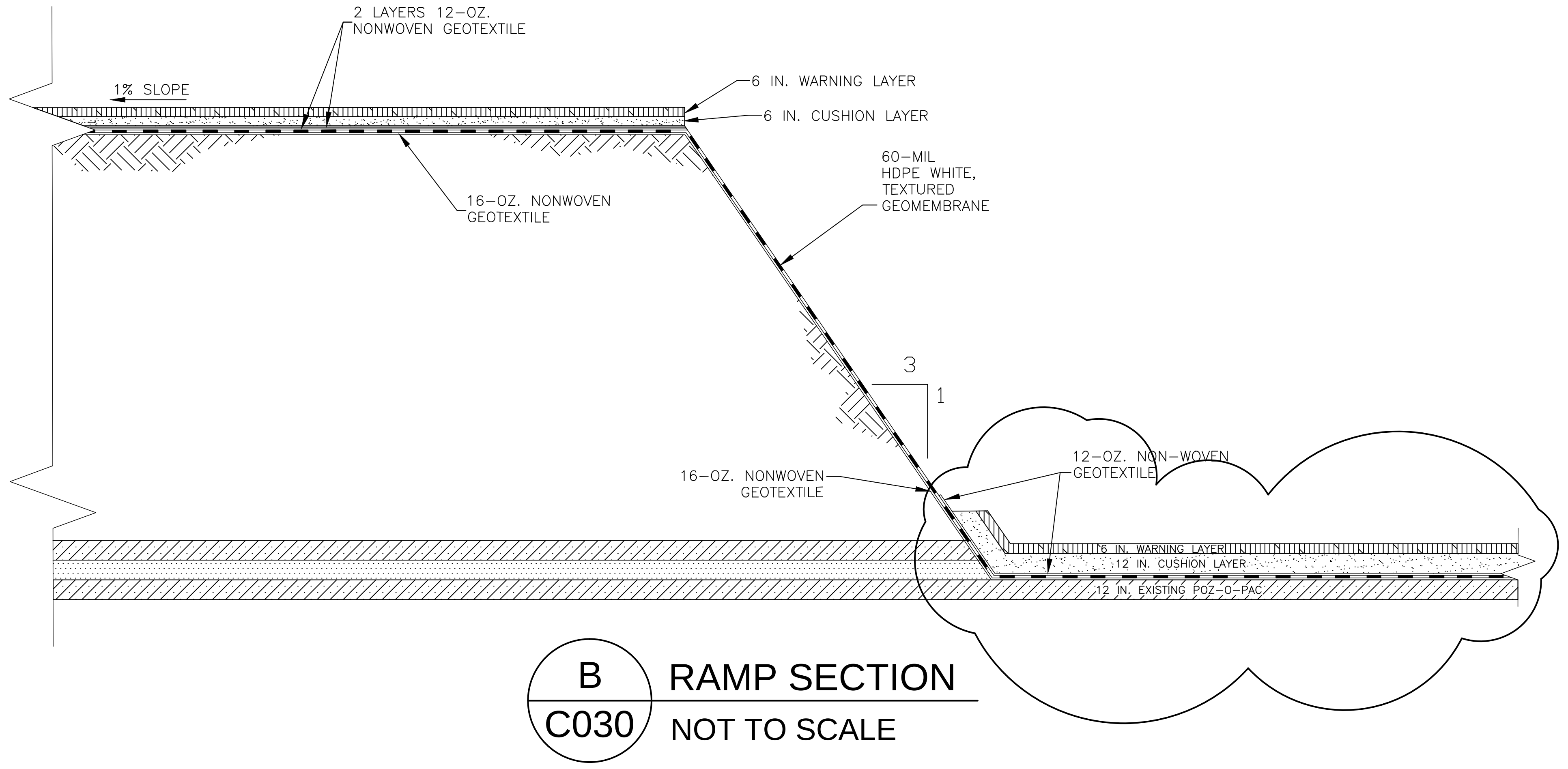
DRAWING NO: D1900C030-04
REFERENCE: .

SHEET NO.
C030

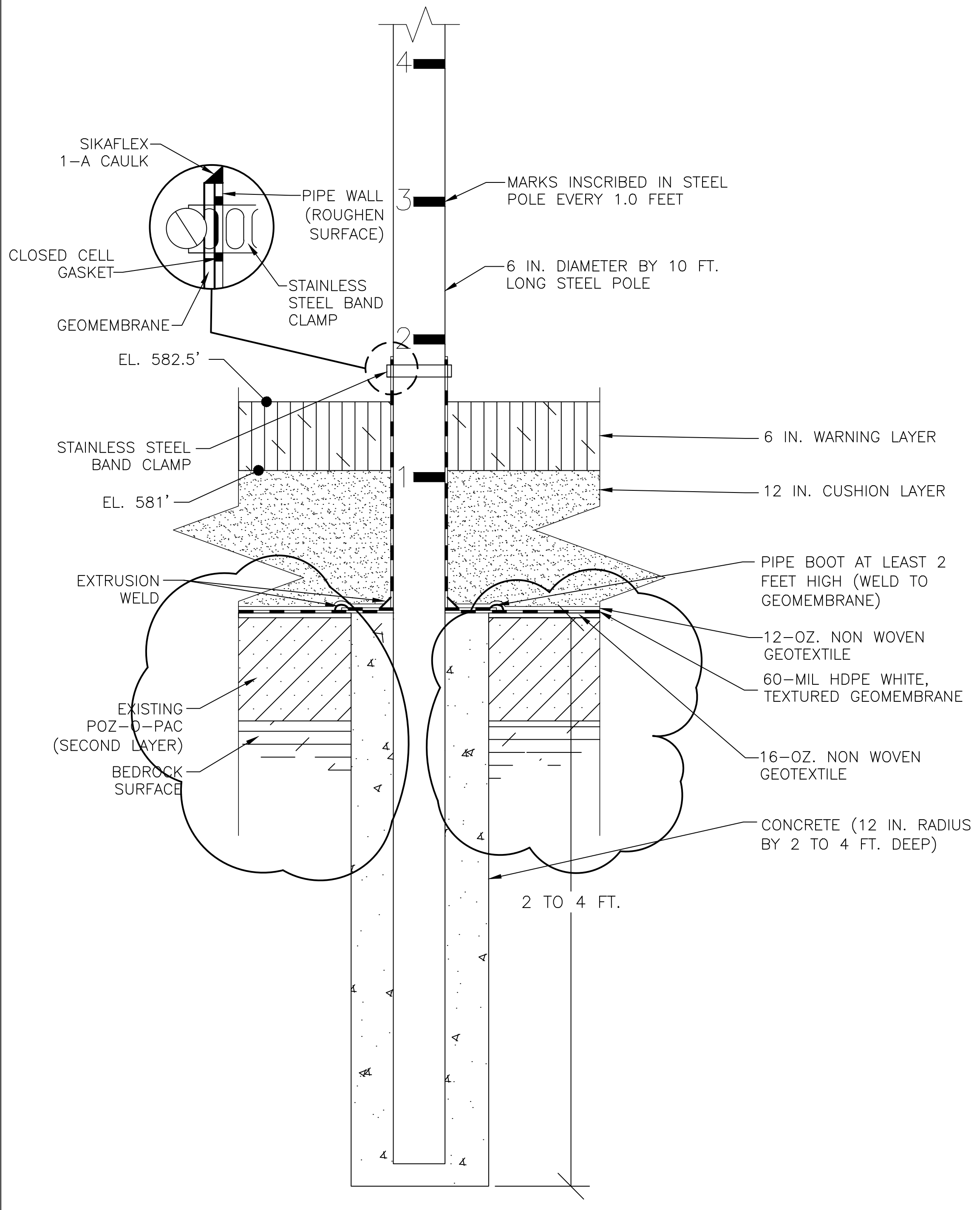


NOTE:
1. GEOMEMBRANE SEAMS SHALL BE PLACED 2 TO 5 FT. FROM TOE OF SLOPE AT A MINIMUM.

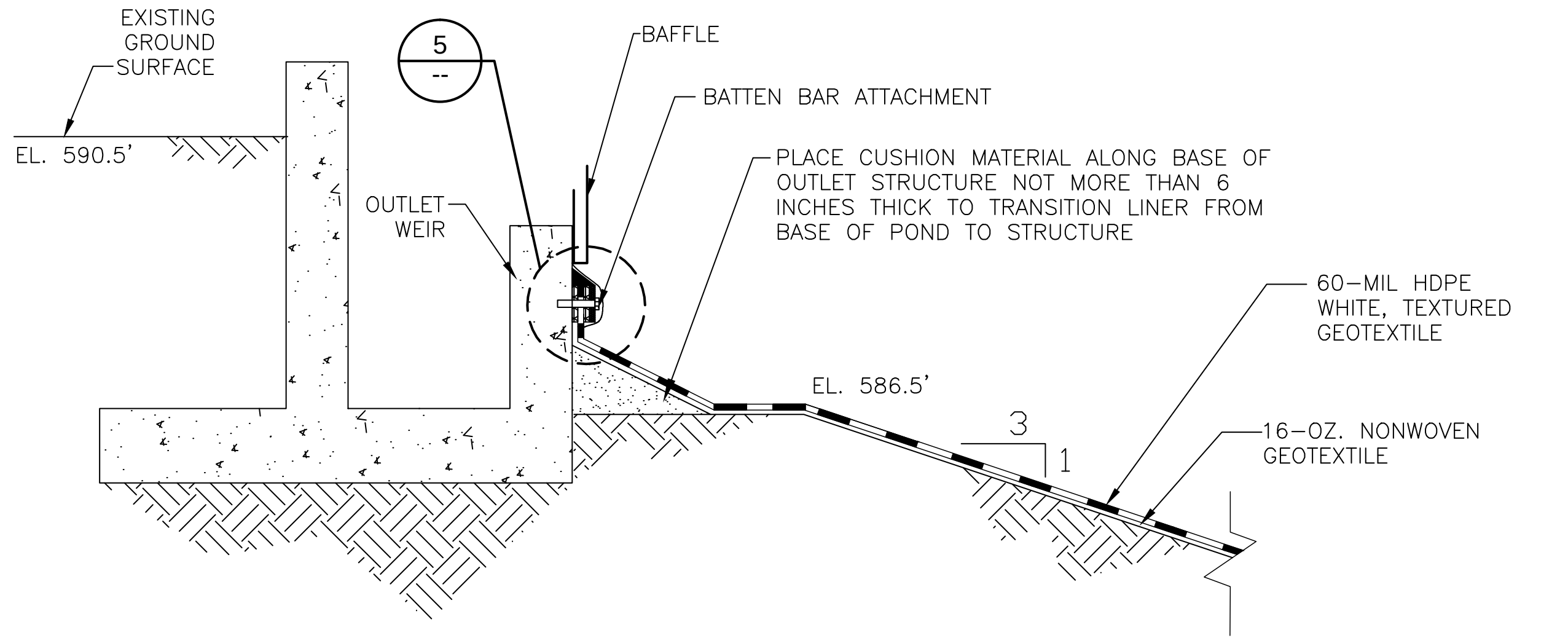
A / C030 SLOPE TRANSITION SECTION
NOT TO SCALE



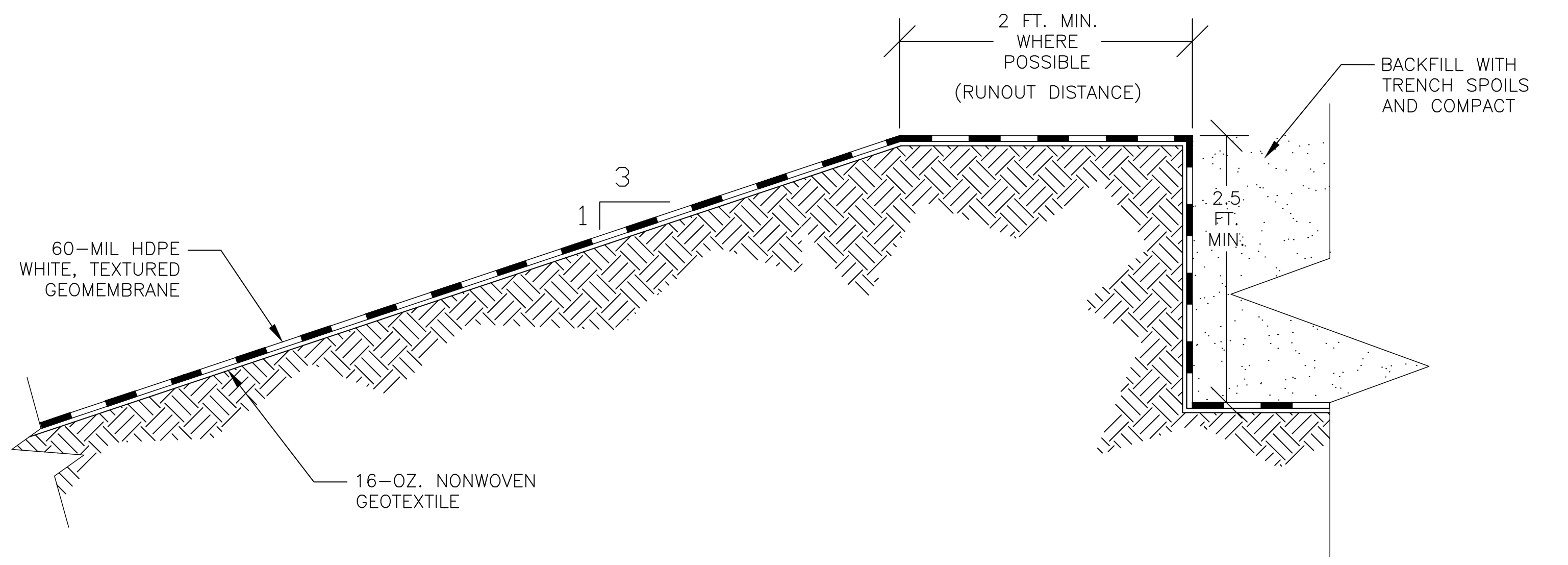
B / C030 RAMP SECTION
NOT TO SCALE



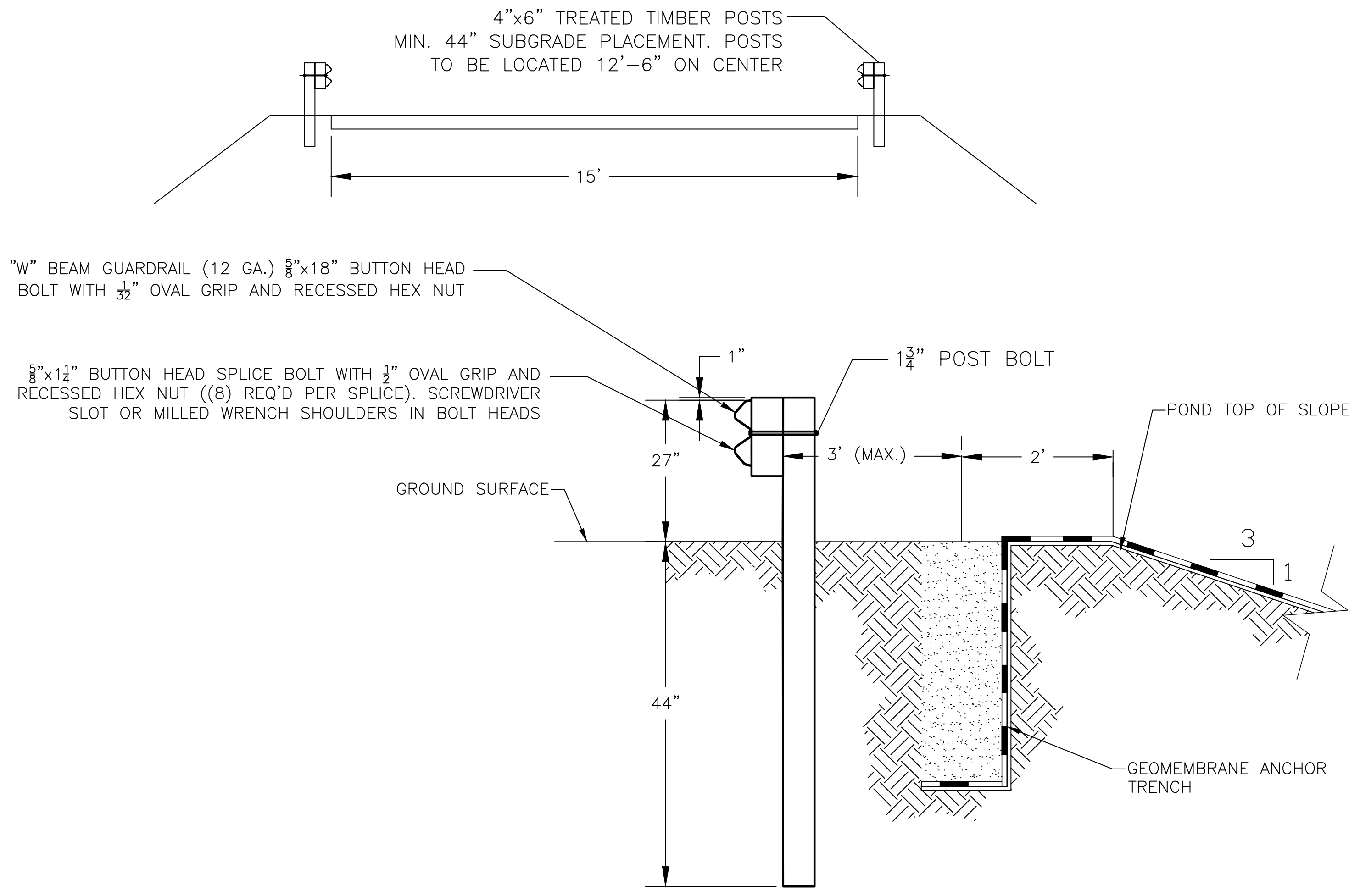
1 / C020 MARKER POST DETAIL
NOT TO SCALE



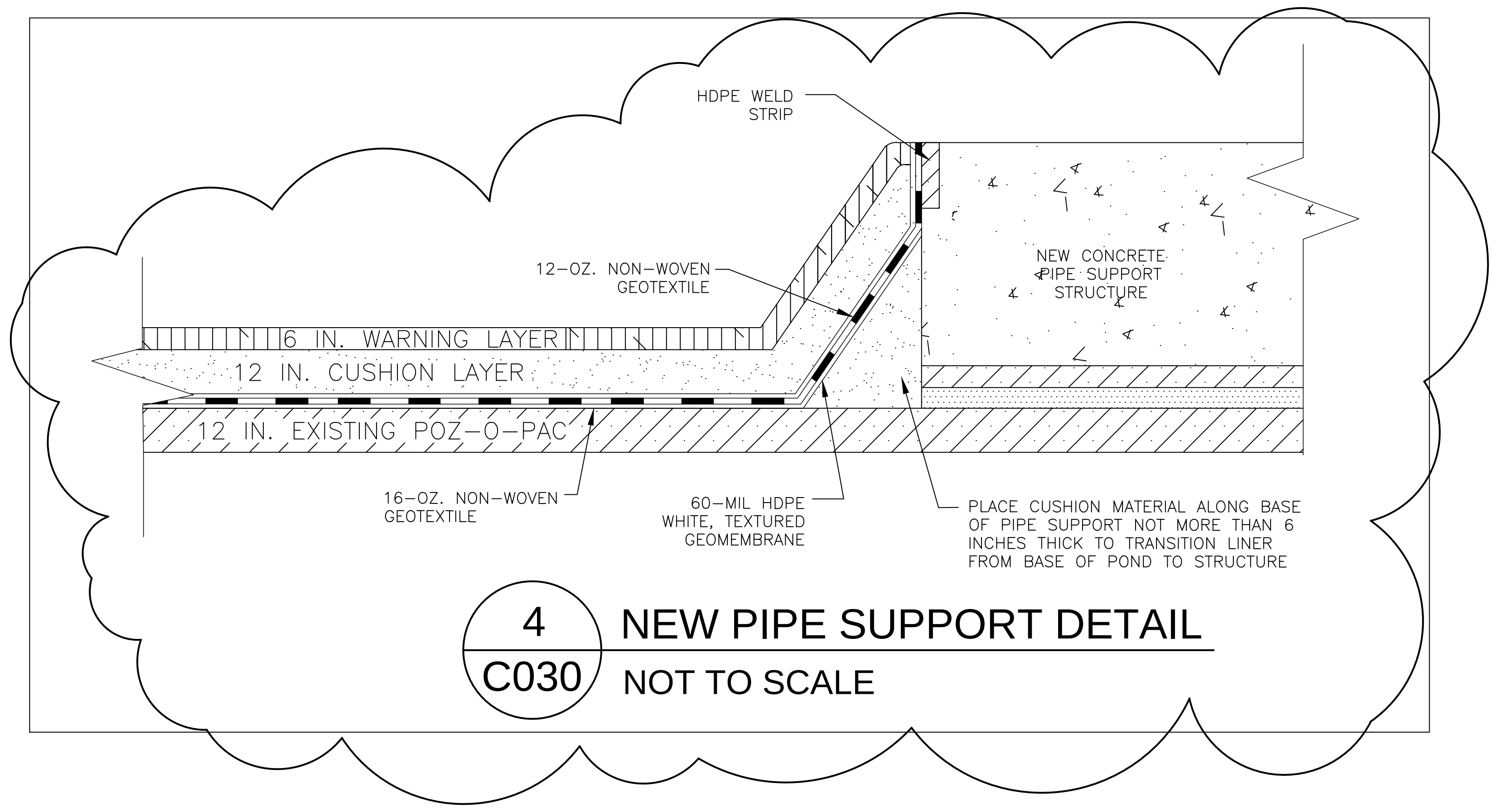
2 / C030 OUTLET WEIR DETAIL
NOT TO SCALE



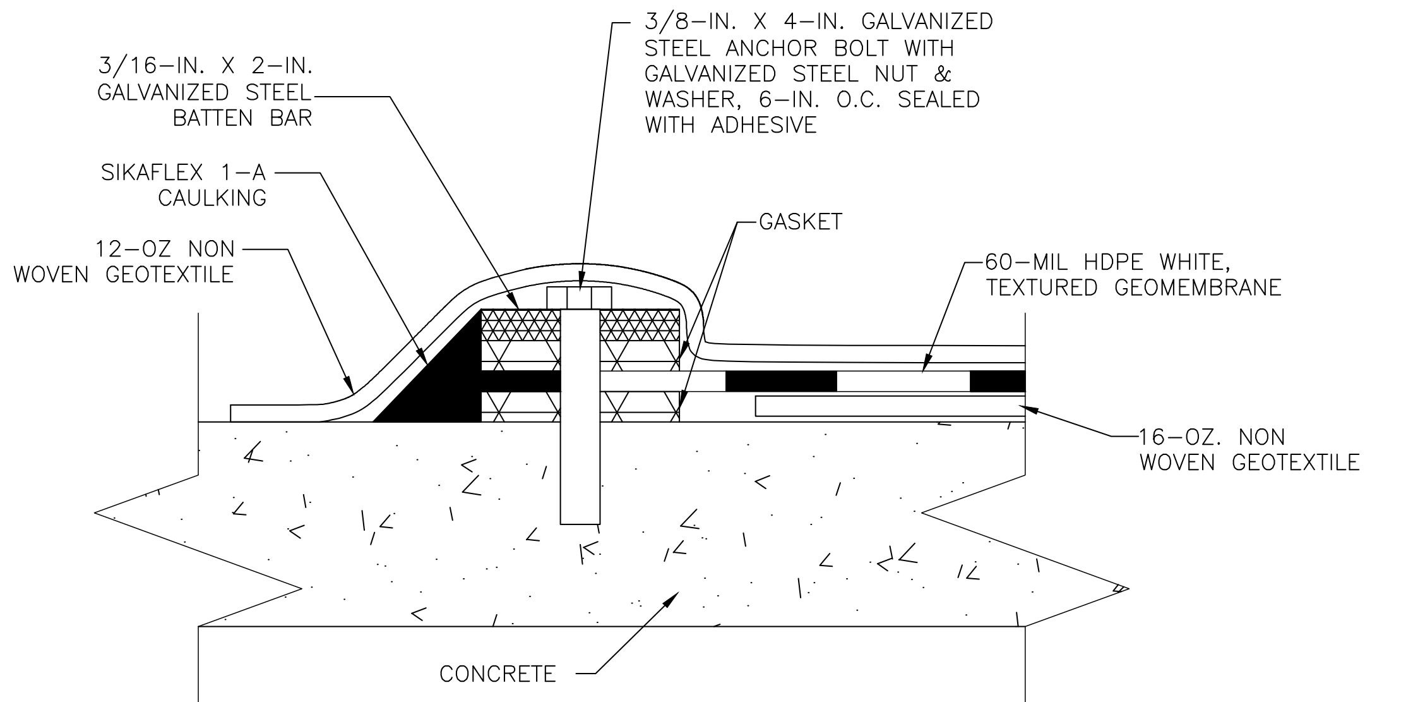
3 / C030 ANCHOR TRENCH DETAIL
NOT TO SCALE



6 / C030 GUARDRAIL DETAIL
NOT TO SCALE



4 / C030 NEW PIPE SUPPORT DETAIL
NOT TO SCALE



NOTE:
1. ANCHOR BOLTS 6 IN. ON CENTER.

5 / -- BATTEN BAR ATTACHMENT
NOT TO SCALE

	REVISION:	DATE:	APP'D BY:
6.			
5.			
4.	RECORD DOCUMENTATION FOR SOUTH ASH POND 3	12/30/09	HMS
3.	ISSUED FOR CONSTRUCTION	08/28/09	HMS
2.	ADDENDUM NO. 1	09/15/08	HMS
1.	ISSUED FOR BID	08/20/08	HMS
0.	ISSUED FOR PERMIT	07/15/08	HMS

NATURAL
RESOURCE
TECHNOLOGY

PROJECT NO. 1900
DRAWN BY: RLH/KNW 6/23/08
CHECKED BY: EJT 6/23/08
APPROVED BY: HMS 7/15/08

DETAILS AND SECTIONS
SOUTH ASH POND LINER REPLACEMENT
MIDWEST GENERATION
WILL COUNTY GENERATING STATION
ROMEOVILLE, ILLINOIS

DRAWING NO: D1900C031–04
REFERENCE: \bids–con
SHEET NO. C031

Attachment 1-4 – Pond 2S HDPE Liner Replacement Specifications

SECTION 00001
SPECIFICATION DATA SHEET

INTRODUCTORY PAGE

SPECIFICATION TITLE:	South Ash Pond 2 Liner Replacement Midwest Generation, LLC Will County Generating Station Romeoville, Illinois
REVISION NO.:	0
DATE:	May 5, 2013
MIDWEST GENERATION PROJECT MANAGER:	Jeffrey Beaudry – (815) 372-4631
NATURAL RESOURCE TECHNOLOGY, INC. (NRT) ENGINEERS:	Heather M. Simon, PE – Project Manager – (907) 782-5114 Eric J. Tlachac, PE – Project Engineer – (262) 522-1214 Ryan Baeten, PE – Project Engineer – (920) 362-8133

DESCRIPTION OF WORK SUMMARY:

Replacement of liner in South Ash Pond 2 at Will County Generating Station in Romeoville, Illinois. Site activities will consist of subgrade preparation, liner preparation and installation, protection layer installation, and leak location survey. Site activities will consist of removal of existing Poz-o-Pac layer, subgrade preparation, including grading, excavation, transport, stockpiling and disposal (as needed to meet 3H:1V slopes), placement of concrete pad around pipe supports, excavation of anchor trench, installation of white, 60-mil HDPE geomembrane and surrounding geotextile, placement of warning layer and cushion layer materials, installation of concrete-filled Geocell, and leak location survey of geomembrane.

END OF SECTION

SECTION 01050
CONSTRUCTION DOCUMENTATION AND SURVEYING

PART 1 – GENERAL

1.01 SECTION INCLUDES

- A. Work by Contractor
- B. Contractor’s Responsibilities and Submittals
- C. Survey Data for Construction Documentation
- D. Construction Documentation Drawings

1.02 WORK BY CONTRACTOR: Contractor shall provide construction documentation and surveying services as required for proper completion of work including:

- A. Documenting topography of prepared subgrade prior to geomembrane placement.
- B. Documenting location and dimensions of anchor trench.
- C. Documenting location and elevation of geomembrane panels, seams, and repairs.
- D. Documenting location of guardrails.
- E. Documenting topography of warning layer and geocell layer (final surface).

1.03 CONTRACTOR’S RESPONSIBILITIES AND SUBMITTALS

A. Upon commencement of construction work, become familiar with the location of existing benchmarks, control points, and other necessary reference points. Maintain their accuracy and prevent disturbance or destruction. Contractor is responsible for re-establishing control points and benchmarks if such items are damaged and/or destroyed at no cost to Owner.

B. Establish and verify grades, lines, levels, locations, and dimensions as shown on Drawings and report any errors or inconsistencies to Owner and/or Engineer before commencing work

C. Initial staking of underground utilities and anchor trench.

D. Lay out work and be responsible for all surveys, lines, elevations, and measurements of structures and other work executed under Contract. Exercise proper preparation to verify dimensions on Drawings, within construction limits, before laying out work. Any error resulting from failure to exercise such precautions or work done without being properly located may be removed at Owner’s direction and corrected or replaced at Contractor’s expense.

E. Contractor shall verify work with respect to design grades prior to documentation surveys. Areas deficient will be corrected and resurveyed at Contractor’s expense.

1.04 SURVEY DATA FOR CONSTRUCTION DOCUMENTATION

A. Survey work performed by Contractor shall be certified by a Professional Land Surveyor (PLS) licensed in the State of Illinois, and will include items identified in Table 1.

B. Frequency of surveys for each item is summarized in Table 1 and relevant Sections of the Technical Specifications.

C. Engineer shall be present for documentation survey. Contractor shall notify Engineer at least 2 working days prior to performance of each documentation survey.

D. Survey data shall be submitted to Owner and/or Engineer in one of the following formats within two working days after completion of survey:

1. Topographic map (electronic files compatible with AutoCAD and Portable Document Format or PDF).

2. Tabular (electronic file compatible with Microsoft Excel according to Table 1, at minimum indicating: northing, easting, elevation, and description).

E. Contractor will be notified by Owner and/or Engineer of areas to be adjusted or will be given written approval of surveyed area within two working days of receiving survey data.

F. Contractor shall obtain written approval from Owner and/or Engineer for each surveyed area prior to placement of any overlying materials.

1.05 CONSTRUCTION DOCUMENTATION DRAWINGS

A. Contractor shall submit record drawings to Owner and/or Engineer based on results of documentation survey within four working days following completion of survey for a particular surface or set of features as prepared by the PLS.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01300
SUBMITTALS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. General Requirements

B. Submittal Format

C. Submittal Procedures

1.02 GENERAL REQUIREMENTS

A. Procedures and format for submittals required by the Contract Documents that may include, but are not limited to:

1. Soil and/or material test data.
2. Survey data.
3. Product test data.
4. Progress reports.
5. Shop drawings.
6. Manufacturer’s instructions, certificates, guarantees, and warranties.
7. Management, staging, and sequencing plans.
8. Schedules.

B. Refer to Contract Documents and Table 2 for list of submittals.

1.03 SUBMITTAL FORMAT

A. Submittals shall be transmitted by Contractor with the following identified on the cover sheet:

1. Project name and contract number.
2. Applicable Specification (Section) and submittal number.
3. Date (or revision number).
4. Sequential page numbers.

B. Submittals shall be made electronically via email.

C. Stamp, sign, or initial submittal certifying products or field dimensions, whichever pertains, are in accordance with requirements of the Contract Documents.

1.04 SUBMITTAL PROCEDURES

A. Provide all submittals and information as identified in Contract Documents to named parties in the time frames indicated in Table 2. Payments may be withheld, in whole or in part, at the discretion of the Owner in the event that submittals are not made within times specified unless previously requested in writing by the Contractor (to Owner and/or Engineer) and approved in writing by Owner and/or Engineer.

<u>Transmit Submittals to Owner Representative</u>:
Jeffrey Beaudry
Will County Generating Station – Midwest Generation, LLC
529 E. 135th Street
Romeoville, IL 60446

jbeaudry@mwgen.com
Phone: (815) 372-4631
Fax: (815) 372-4565

<u>Transmit Submittals to the Project Engineers:</u>

Eric J. Tlachac, PE	Ryan Baeten, PE
etlachac@naturalrt.com	rbaeten@naturalrt.com

Natural Resource Technology, Inc.
23713 W. Paul Rd., Suite D
Pewaukee, WI 53072
Phone: (262) 523-9000
Fax: (262) 523-9001

B. Transmit submittals by appropriate means to expedite review of submittal. Submittals delivered by hand, facsimile, or mail service are acceptable, however, email is preferred. Business addresses of project representatives will be provided at the pre-construction meeting.

C. Submittals shall be made far enough in advance of the scheduled approval dates to allow adequate time for reviews, approvals, and revisions.

D. Submittals shall identify variations from Contract Documents and product or system limitations that may be detrimental to successful performance of completed work.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01400
QUALITY ASSURANCE AND CONTROL

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Construction Quality Assurance

B. Contractor's Role (Quality Control)

C. Engineer's Role

D. Owner's Role

1.02 CONSTRUCTION QUALITY ASSURANCE

A. Owner shall arrange for and inform Contractor of inspection and testing activities to confirm that the construction activities and completed Work complies with Contract Documents.

B. Owner's inspection and testing activities shall consist of following activities:

1. Daily observation and record of Contractor activities.
2. Obtain material samples and transport samples to laboratory, as necessary.
3. On-site visual material inspection and testing.
4. Verifying compliance with Contract Documents.

1.03 CONTRACTOR'S ROLE (QUALITY CONTROL)

A. Perform work in strict accordance with Contract Documents, using necessary construction procedures and techniques. Coordinate, supervise, and oversee subcontractors as needed to perform construction activities.

B. Perform testing as deemed necessary to satisfy requirements of Contract Documents related to off-site materials prior to delivery to site. Materials that do not meet specifications shall be removed from site at Contractor's expense.

C. Contractor shall replace and/or recompact material at Contractor's expense, if soil compaction is not acceptable, in accordance with compaction requirements.

D. Furnish material samples and provide assistance with on-site inspection and test activities.

E. Provide submittals required by Contract Documents within times specified. Failure to do so will result in withholding of payment.

F. Perform or arrange survey and layout to perform Work in accordance with Contract Documents.

G. If manufacturer’s instructions and/or standard industry practice conflicts with Contract Documents, request clarification from Owner and/or Engineer before proceeding.

H. Communicate any pertinent issues with the Owner and/or Engineer.

1.04 ENGINEER’S ROLE

A. Provide clarifications to Contract Documents, as well as any necessary design changes requested by the Owner.

B. Issue a Field Directive in cases where deviation from specified design or Contract Documents is necessary.

C. Communicate any pertinent issues with the Owner and/or Contractor.

D. Confirm construction compliance with Contract Documents by performing observations, inspections, verifications, and documentation activities, as directed by Owner.

E. Provide photo documentation and daily written reports documenting construction activities.

F. Perform or observe soil and/or geosynthetic inspections and testing to confirm materials and installed products meet requirements herein, as directed by Owner.

1.05 OWNER’S ROLE

A. Perform Owner’s engineering review and monitor construction progress, provide progress payment approvals, and provide approval of field job orders.

B. Confirm construction compliance with Contract Documents by performing observations, inspections, verifications, and documentation activities, as necessary.

C. Perform Owner’s administrative and managerial responsibilities. Owner has authority to accept/reject materials and workmanship, and for dispute resolution.

D. Communicate any pertinent issues with Contractor and/or Engineer. Maintain communication with IEPA, as necessary.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01500
CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Use of Site Facilities

B. Security

C. Access Roads and Parking

D. Telephone Service

E. Temporary Utilities

F. Sanitary Facilities

G. Equipment Storage Locations

H. Dust and Mud Controls

I. Construction Noise

J. Water and Erosion Controls

K. Barriers and Protection of Installed Work.

L. Site Progress Cleaning

M. Fuel Storage and Handling

N. Protection of the Environment

O. Public Road Requirements

P. Additional Requirements

1.02 USE OF SITE FACILITIES

A. Use of Site

1. Contractor shall consult with the Owner and/or Engineer regarding locations for offices, trailers, material storage, access roads, fences, gates, and areas within construction limits for use by Contractor.

2. Contractor shall conduct construction activities in a manner to minimize interference with plant operations.

3. Confine equipment, storage of materials, and operations of workmen to areas designated by the Owner. Do not bring materials onto site until reasonably required for progress of work. No area outside of construction limit or staging area may be used for any purpose by Contractor or subcontractors unless expressly approved by the Owner in writing.

4. Store, place, and handle material and equipment to protect from any damage. Contractor shall move materials, sheds, or storage platforms, as necessary or when required for continuing construction at Contractor’s expense.

5. Owner assumes no responsibility for project material or equipment stored on-site or off-site. Contractor assumes full responsibility for damage due to storage of materials.

6. Contractor is responsible to schedule work, storage of materials, etc., to minimize interference with construction activities.

7. Contractor is responsible for all snow removal as necessary during duration of project, as necessary.

8. Contractor is responsible for controlling sediment migration, preventing tracking of sediment onto site access roads and public roads, and cleaning site access roads and public right-of-ways and streets daily (or as deemed necessary by Owner) with commercial street sweepers.

B. Contractor shall inspect site with Owner and/or Engineer prior to start of work to determine existing conditions in conjunction with preconstruction meeting.

1.03 SECURITY

A. Security is not provided by Owner for Contractor’s property.

B. Contractor is responsible for loss or injury to persons or property where his work is involved, and shall provide security and take precautionary measures as deemed necessary to protect Contractor’s and Owner’s interests.

1.04 ACCESS ROADS AND PARKING

A. Contractor shall maintain the service road accessing the construction areas and stockpile areas as necessary, or as directed by Owner and/or Engineer.

B. Contractor shall use the south plant entrance that crosses over station train tracks for truck access to deliver material. Note train traffic occurs frequently and has the right of way, which may cause trucks to wait and delay delivery.

C. Parking areas on-site shall be within the work area or area designated by Owner

1.05 TELEPHONE SERVICE

A. Contractor shall provide, maintain, and pay for cellular phone service for Contractor's designated on-site superintendent or foreman. In addition, subcontractor's designated on-site personnel shall have cellular phones.

1.06 TEMPORARY UTILITIES

A. Electricity

1. Contractor shall arrange with Owner for temporary electrical service as needed.

3. OSHA regulations require that employers shall use either ground fault circuit interrupters (GFCIs) or an assured equipment grounding conductor program (AEGCP) in addition to any other regulations for equipment grounding conductors.

4. Utilize and remove upon completion of project an electrical distribution system for temporary light and power during construction, if necessary.

B. Water

1. Contractor shall arrange with Owner for water service as needed. Contractor shall furnish and install all temporary connections required to complete Work and shall furnish his own shutoff valves and hose connections.

2. Contractor may use the water in the South Run-off Basin or shall provide clean water to be used for dust suppression in work areas. Dust suppression will be necessary for haul roads, stockpile areas, and within construction limits. Submit source of clean water to be used for dust suppression to Owner and/or Engineer for approval prior to project commencement.

3. Contractor shall provide potable water for Contractor's employees, as necessary.

1.07 SANITARY FACILITIES

A. Contractor shall provide sanitary facilities on-site conforming to state and local health and sanitation regulations in sufficient number for use of Contractor's employees.

B. Contractor shall maintain on-site facilities in sanitary condition at all times.

1.08 EQUIPMENT STORAGE LOCATIONS

A. Contractor shall park equipment and store materials only in areas proposed by Contractor and approved by Owner.

B. Restore disturbed areas to pre-construction condition upon project completion.

1.09 DUST AND MUD CONTROLS

A. Conduct operations and maintain site to minimize creation and dispersion of dust and mud.

B. Provide equipment necessary to control dust generation resulting from wind effects on open stockpiles, excavations, and from Contractor's vehicle and equipment traffic at all times. Control dust by application of water to affected areas, such that surfaces are moistened to prevent dust from becoming a nuisance to public, neighbors, and concurrent performance of other work at site. Contractor shall prevent dusting 24 hours a day from project commencement to substantial completion of the work.

D. Control mud and tracking of mud over site access roads and public roads along haul routes. Maintain surfaces in proper condition to facilitate removal efficiency.

E. The Owner and/or Engineer shall monitor site conditions related to dust and mud generation on a daily basis and direct Contractor to take actions as necessary to address deficient practices or conditions deleterious to construction and/or public.

F. Clean public right-of-ways and streets as deemed necessary by Owner with commercial street sweepers.

1.10 CONSTRUCTION NOISE

A. The Owner shall decide on the adequacy of provision and maintenance of noise reduction equipment. When so instructed by the Owner, the Contractor shall immediately withdraw any equipment from service and carry out all necessary additions, replacements, or repairs to the noise reduction equipment to the satisfaction of the Owner.

1.11 WATER AND EROSION CONTROLS

A. Contractor shall install and maintain erosion control measures necessary to prevent runoff, tracking, or loss of soil materials by water or mechanical action from disturbed portions of the site or excavation areas(s), as shown on the Contract Drawings and in accordance with the project’s Storm Water Pollution Prevention Plan (SWPPP), as presented in Appendix A.

B. No direct discharge shall be allowed into any of the ponds on-site without the approval from Owner.

1.12 BARRIERS AND PROTECTION OF INSTALLED WORK

A. Contractor shall protect installed work and provide special protection as needed.

B. Construction traffic shall be prohibited on completed and/or landscaped areas.

C. Protect existing facilities and adjacent properties from damage during construction operations.

1.13 SITE PROGRESS CLEANING

A. Maintain areas free of waste materials, debris, and rubbish. Site shall be maintained in clean and orderly condition.

B. Remove waste materials, debris, and rubbish from site weekly and dispose off-site at Contractor’s expense and in accordance with federal, state, and local regulations.

C. Contractor shall provide a dumpster on-site for general waste materials and rubbish during site activities.

1.14 FUEL STORAGE AND HANDLING

A. Store fuel according to local, state, and federal laws.

B. At no time shall overtopping fuel tanks or spillage to the ground surface be allowed.

1.16 PROTECTION OF THE ENVIRONMENT

A. Minimize air pollution by use of properly operating emission control devices on construction vehicles and equipment. Encourage shutdown of motorized equipment not in use.

B. Trash burning not permitted on-site.

C. All areas for handling and storage of fuels, oils, and other potentially hazardous liquids shall have spill containment or release prevention measures. Maintenance of equipment on-site shall be with prior approval of the Owner and/or Engineer.

D. All waste materials shall be recycled, hauled to a licensed solid waste landfill, or otherwise disposed of in an environmentally sound manner and in compliance with all applicable local, state, and federal rules.

E. All hazardous waste shall be stored, handled, and disposed of in compliance with applicable local, state, and federal rules.

F. Other measures shall be taken, as necessary, to maintain work site in an environmentally sound matter.

G. All spills or leaks of fuels, oil, or other IEPA-reportable liquids resulting from handling or equipment malfunctions shall be reported immediately to Owner and/or Engineer. Affected soils shall be properly removed from limits of construction and disposed in accordance with applicable local, state, and federal rules at the sole expense of the Contractor and as agreed by the Owner and/or Engineer. Copies of manifests, if necessary, shall be provided to Owner and/or Engineer within five working days of disposal. Waste Generator Manifests shall not state Owner as Generator. Owner reserves right to order leaking equipment removed from site.

1.17 PUBLIC ROAD REQUIREMENTS

A. Contractor shall comply with Local Weight Limits. Local roads shall be cleaned daily, as necessary, to maintain their condition free of mud and dirt.

B. The Contractor shall conduct his operations on the site in a manner that will minimize interference with the normal operation of plant, adjoining public and private roads and parking lots, and shall implement all specified and other appropriate measures to ensure the safety of all users of the adjoining public and private roads and parking lots.

C. Contractor shall provide flag person(s) as necessary and at request of Owner and/or Engineer.

1.18 ADDITIONAL REQUIREMENTS

A. No cameras are allowed on the site without permission from the Owner.

B. No firearms or explosives are allowed on-site.

C. Possession and/or use of intoxicating beverages and nonprescription drugs are prohibited at all times. Persons caught in possession or under the influence of drugs or alcohol will be immediately dismissed and removed from the site.

D. Smoking will be allowed in designated areas only.

E. No horseplay is permitted on the job site.

F. Visitors or personnel not employed by the Contractor or his approved Subcontractors shall not be permitted on-site without prior approval by the Owner.

G. Owner and/or Engineer reserve the right to require that any of the Contractor's personnel be excluded from work at the site at any time.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 01700
PROJECT CLOSEOUT

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Description of Work

B. Procedures

C. Record Documents

1.02 DESCRIPTION OF WORK

A. To provide an orderly and efficient transfer of the completed Work to the Owner.

1.03 PROCEDURES

A. Remove temporary above grade or buried utilities, equipment, and materials prior to final application or payment inspection, Clean and repair damage caused by installation or use of temporary facilities.

B. Substantial Completion: When all work described in the contract documents is completed:

1. Owner and/or Engineer will prepare and submit a list of items to be completed for Contractor review and completion.

2. Should the Owner and/or Engineer determine that the Work is not substantially complete; Contractor will remedy the deficiencies and notify the Owner and/or Engineer when ready for re-inspection.

C. Final Completion:

1. Remove waste and surplus materials, rubbish, and construction facilities from site.

2. Prepare and submit the notice that all Work is complete.

3. Certify in writing that the Work is complete and ready for final inspection.

4. Owner and/or Engineer will make a final inspection to verify status of completion.

1.04 RECORD DOCUMENTS

A. Contractor will maintain on-site one set of record documents of all items of Work:

1. Drawings.

2. Technical Specifications.

3. Change orders and other modifications to contract.

4. A copy of approvals of work performed.

5. Submittals.

B. Engineer, as directed by Owner, will record information concurrent with construction progress including changes made by addenda and modifications.

C. Contractor will maintain a Daily Field Log including work times, personnel on-site, equipment used, and other essential information of the Work progress.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 02078
GEOCELL CELLULAR CONFINEMENT

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. This Section includes providing all material, labor, tools, and equipment for installation of geocell cellular confinement as shown in the Contract Documents and as specified in this Section.

B. The geocell cellular confinement system shall be used for slope protection.

1.02 REFERENCES

A. Latest version of ASTM International standards:

1. ASTM D638 - Standard Test Method for Tensile Properties of Plastics
2. ASTM D1505 - Standard Test Method for Density of Plastics by the Density-Gradient Technique
3. ASTM D1603 - Standard Test Method for Carbon Black Content in Olefin Plastics
4. ASTM D1693 - Standard Test Method for Environmental Stress-Cracking of Ethylene Plastics
5. ASTM D5199 - Standard Test Method for Measuring the Nominal Thickness of Geosynthetics
6. ASTM E41 - Terminology Relating to Conditioning

1.03 SUBMITTALS

A. Submit manufacturer's shop drawings in accordance with the Contract Documents, including Manufacturer's product data, samples, and section layout.

B. Five days prior to delivery, submit manufacturer's certification of polyethylene used to make geocell material including:

1. Manufacturer's certification of percentage of carbon black.
2. Resin manufacturer's certification of polyethylene density and environmental stress crack resistance (ESCR).
3. Origin (supplier's name and production plant) and identification (brand name and number) of resin used to manufacture geocell.
4. Copies of dated quality control certificates issued by resin supplier.

5. Results of tests conducted by geocell manufacturer to verify that resin used to manufacture geocell meets Specifications.

6. Installation schedule.

7. List of geocell section numbers corresponding to the QA Testing List of materials that comprise geocell, expressed in following categories as percent by weight: polyethylene, carbon black, other additives.

8. Written certification that geocell manufacturer guarantees minimum values given in manufacturer's specification.

9. Quality control certificates, signed by geocell manufacturer. Each quality control Certificate shall include applicable roll identification numbers, testing procedures, and results of quality control tests.

C. With bid, qualification certifying the Geocell Installer has 5 years of experience installing the specified products in the specified application. Include resumes of Geocell Installer superintendent and technicians, including dates and duration of employment.

1. Qualified Geocell Installer approved by Engineer:

    a. Clean Air and Water Systems, LLC (CAAWS)
    123 Elm Street, Dousman, WI 53118
    Brian McKeown, Owner & Construction Manager
    Phone: (262) 965-4366

    b. Or other approved by Owner and/or Engineer.

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1.04 QUALITY ASSURANCE AND CONTROL

A. The geocell cellular confinement system material shall be provided from a single Manufacturer for the entire project.

B. The Manufacturer shall provide certification of compliance to all applicable testing procedures and related specifications prior to delivery.

C. Pre-Installation Meeting: Prior to installation of any materials, conduct a pre-installation meeting to discuss the scope of work and review installation requirements. The pre-installation meeting shall be attended by all parties involved with the installation of the cellular confinement system.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to site in Manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and Manufacturer.

B. The materials shall be stored in accordance with Manufacturer's instructions. The materials shall be protected from damage and out of direct sunlight.

C. The materials shall be delivered, unloaded, and installed in a manner to prevent damage.

1.06 WARRANTY

A. The Manufacturer shall warrant each geocell section that it ships to be free from defects in materials and workmanship at the time of manufacture. The Manufacturer's exclusive liability under this warranty or otherwise will be to furnish, without charge to the original freight on board (f.o.b.) point, a replacement for any section which proves to be defective.

B. This warranty shall not cover defects attributable to causes or occurrences beyond the Manufacturer's control and unrelated to the manufacturing process, including, but not limited to, abuse, misuse, mishandling, neglect, improper storage, improper installation, improper alteration, or improper application.

PART 2 - PRODUCTS

2.01 GEOCELL CELLULAR CONFINEMENT SYSTEM

A. Base Materials

1. Polyethylene Stabilized with Carbon Black

   a. Density shall be 58.4 to 60.2 pound/ft^3 (0.935 to 0.965 g/cm^3) in accordance with ASTM D1505.

   b. Environmental Stress Crack Resistance (ESCR) shall be 5,000 hours in accordance with ASTM D1693.

   c. Ultra-Violet light stabilization with carbon black.

   d. Carbon Black content shall be 1.5 to 2 percent by weight, through addition of a carrier with certified carbon black content.

   e. Carbon black shall be homogeneously distributed throughout material.

   f. The manufacturer must have an in-place quality control program to prevent irregularities in strip material.

B. Cell Properties

1. Individual cells shall be uniform in shape and size when expanded.

2. Individual cell dimensions (nominal) shall be dimensions ± 10%.

3. Geoweb® GW30V4 manufactured by Presto Geosystems

   a. Length shall be 11.3 inches.

b. Width shall be 12.6 inches.

c. Nominal area shall be 71.3 in^2 plus or minus 1%.

d. Nominal depth shall be 4 inches.

C. Strip Properties and Assembly

1. Perforated Textured Strip/Cell

    a. Strip sheet thickness shall be 50 mil, minus 5 percent, plus 10 percent in accordance with ASTM D5199. Determine thickness flat, before surface disruption.

    b. Polyethylene strips shall be textured surface.

    c. Textured sheet thickness shall be 60 mil plus or minus 6 mil.

    d. Textured surface density shall be 140 to 200 per in^2.

    e. Perforated with horizontal rows of 0.4-inch diameter holes.

    f. Perforations within each row shall be 0.75 inches on-center.

    g. Horizontal rows shall be staggered and separated 0.50 inches relative to hole centers.

    h. Edge of strip to nearest edge of perforation shall be a minimum of 0.3 inches.

    i. Centerline of spot weld to nearest edge of perforation shall be a minimum of 0.7 inches.

    j. A slot with a dimension of 3/8 inch × 1-3/8 inch is standard in the center of the nonperforated areas and at the center of each weld.

    k. Geocell strips shall have a minimum strength at yield of 1025 lb/ft as determined in accordance with ASTM D638 and tested on the geocell strip in the area with the densest perforations.

2. Assembly of Geocell Sections

    a. Fabricate using strips of sheet polyethylene each with a length of 142 inches and a width equal to cell depth.

    b. Connect strips using full depth ultrasonic spot-welds aligned perpendicular to longitudinal axis of strip.

    c. Ultrasonic weld melt-pool width shall be 1.0 inch maximum.

    d. Weld spacing for Geoweb® GW30V4 sections shall be 17.5 inches plus or minus 0.10 inch.

D. Cell Seam Strength Tests

  1. Minimum seam strengths are required by design and shall be reported in test results. Materials submitted with average or typical values will not be accepted. Written certification of minimum strengths must be supplied to the engineer at the time of submittals.

  2. Short-Term Seam Peel-Strength Test

    a. Cell seam strength shall be uniform over full depth of cell.

    b. Minimum seam peel strength shall be 320 lbf for 4-inch deep geocell.

  3. Long-Term Seam Peel-Strength Test

    a. Conditions: Minimum of 7 days in a temperature-controlled environment that undergoes change on a 1 hour cycle from room temperature to 130 degrees F (54 degrees C).

    b. Room temperature shall be in accordance with ASTM E41.

    c. Test samples shall consist of two, 4-inch wide strips welded together.

    d. Test sample consisting of two carbon black stabilized strips shall support a 160 pound load for test period.

2.02 INTEGRAL COMPONENTS

A. ATRA® Clip

  1. The ATRA® clip is a molded, high-strength polyethylene device available in standard 0.5 inch and metric 10-12 mm versions.

B. ATRA® Key

  1. ATRA® keys shall be constructed of polyethylene and provide a high strength connection.

  2. ATRA® keys shall be used to connect geocell panels together at each interleaf and end to end connection.

C. TP-93 Tendon

  1. Polyester tendons manufactured from bright, high-tenacity, industrial-continuous filament polyester yarn woven into a braided strap. Elongation shall be 9 – 15% at break.

  2. The tendon diameter/width and minimum break strength shall be:

    a. Diameter/Width: 0.75 inches

    b. Minimum Break Strength: 2090 lbf

2.03 INFILL MATERIAL

A. Infill material shall be concrete that is furnished and installed in accordance with Section 03300- Cast-In-Place Concrete.

B. Material along horizontal runout shall be cushion material that is furnished and installed in accordance with Section 02300-Earthwork, as shown on Sheet C031.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify site conditions are as indicated on the drawings. Notify the Engineer if site conditions are not acceptable. Do not begin preparation or installation until unacceptable conditions have been corrected.

B. Verify layout of structure is as indicated on the drawings. Notify the Engineer if layout of structure is not acceptable. Do not begin preparation or installation until unacceptable conditions have been corrected.

3.02 INSTALLATION OF THE CELLULAR CONFINEMENT SYSTEM

A. Prepare subgrade and install geocell confinement system in accordance with Manufacturer's recommendations.

B. Geocell Section Placement and Connection

1. Verify all geocell sections are expanded uniformly to required dimensions and that outer cells of each section are correctly aligned. Interleaf or overlap edges of adjacent sections. Ensure upper surfaces of adjoining geocell sections are flush at joint and adjoining cells are fully aligned at the cell wall slot.

2. Connect the geocell sections with ATRA® keys at each interleaf and end to end connection. Insert the ATRA® key through the cell wall slot before inserting through the adjacent cell. Turn the ATRA® key 90 degrees to lock the panels together.

3. No foot or vehicle traffic shall be allowed on the deployed Geocell sections prior to infill placement.

C. Infill Placement

1. Place infill in expanded cells with suitable material handling equipment, such as a backhoe, front-end loader, conveyor, or crane-mounted skip.

2. Limit drop height to a maximum of 3 feet to avoid damage or displacement of the cell walls.

3. Fill geocell sections from the crest of the slope to toe with infill material (concrete) or as directed by Engineer's. Geocell sections at crest of the slope

along horizontal runout to be filled with cushion material following completion of leak location survey, as shown on Sheet C031.

4. Infill material shall be free-flowing and not frozen when placed into the geocell sections.

5. Evenly spread infill into place.

END OF SECTION

SECTION 02300
EARTHWORK

PART 1 - GENERAL

1.01 WORK INCLUDES

A. Contractor shall remove any accumulated ash, sludge/sediment, and debris from pond by means approved by Owner and/or Engineer. Load, transport, and dispose/stockpile of ash and sludge/sediment on-site.

B. Removal of Poz-O-Pac liner and existing fill material from bottom of South Ash Ponds 2, excluding the area around the pipe support foundations, as needed to achieve subgrade elevation.

C. Load and transport Poz-O-Pac liner material from pond to an approved recycling or disposal facility.

D. Load, transport, and stockpile excavated existing fill material to Owner's approved location on-site for reuse, as needed.

E. Clearing and grubbing vegetation and removing rocks and other debris greater than 3 inches in diameter along sideslopes and base of pond.

F. Load and transport rocks and other debris removed from liner subgrade determined not suitable for on-site disposal by Owner and/or Engineer to an approved recycling or disposal facility.

G. Trenching, backfilling, and compaction for anchoring geomembrane and geotextile including field verifying the location of underground utilities, protection and maintenance of trench, and support of existing structures (e.g. aboveground piping, outlet and inlet).

H. Placement, grading, and compaction of excavated existing fill material or excavated subgrade material, including loading and transporting from on-site stockpile area to reuse as cushion material following installation of Geomembrane, as approved and directed by Owner and/or Engineer.

I. Delivery, placement, and grading of cushion material following installation of geomembrane.

J. Delivery, placement, grading, and compaction of Warning Layer material following placement of cushion material.

1.02 RELATED SECTIONS

A. Section 01050 – Construction Documentation and Surveying

B. Section 02600 – HDPE Geomembrane

1.03 DEFINITIONS

A. Geotechnical Laboratory: Party, independent from the Owner and Contractor, responsible for conducting laboratory tests on soils obtained at the Site under contract with the Contractor.

B. Geotechnical Field Technician: Party, independent from the Owner and Contractor, responsible for conducting field tests on compacted soils at the Site under contract with the Contractor.

C. Structures and Surface Features: Existing structures and surface features, including buildings, signs, posts, utility poles, fences, trees, shrubs, landscaped surface features, and other miscellaneous items.

D. Utilities: Existing gas mains, water mains, electric lines, storm sewers and conduits, telephone and other communication lines and conduits, sewer pipe, cable television, other utilities, and appurtenances.

E. Clearing and Grubbing: cutting, removal, and disposal of trees, roots, brush, stumps, windfalls, logs, and other vegetation.

1.04 REFERENCES

A. ASTM D422 – Standard Test Method for Particle-Size Analysis of Soils.

B. ASTM D2487-93 – Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System).

C. ASTM D2940 – Standard Specification for Graded Aggregate Material for Bases or Subbases for Highways or Airports

D. ASTM D1557 – Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort, (56,000 ft-lbf/ft^3 (2,700 kN-m/m^3)).

E. ASTM D6938 – Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

F. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection.

G. ASTM D3740 - Standard Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction

H. State of Illinois, Department of Transportation (IDOT), Standard Specifications for Road and Bridge Construction, current edition.

I. OSHA 29 CFR Part 1926, Occupational Safety and Health Standards: Excavations.

1.05 PERFORMANCE REQUIREMENTS

A. Excavation and grading shall be done without damage to adjacent property or structures and without interference to public and/or plant, pedestrian, and vehicular traffic.

B. Complete Work to required grades as indicated in the Contract Drawings.

1.06 SUBMITTALS

A. In accordance with Section 01300.

B. Submit with the bid, the name and location of the recycling or disposal facility for the Poz-O-Pac material, rocks, and debris removed from pond deemed unsuitable for on-site disposal by Owner and/or Engineer.

C. Submit prior to start of construction, the name and location of all sources that will be used to obtain the materials specified in this Section.

D. Provide Owner and/or Engineer written notice of construction start date at least five working days prior to beginning site activities.

E. Submit for documentation certificates and/or test results for one sample of each material obtained from off-site sources indicating compliance with Specifications prior to start of construction. Owner and/or Engineer may take random samples of the material upon delivery or placement to verify compliance with the Specifications.

F. Submit geotechnical field test results to Engineer within 24 hours of test completion.

PART 2 - PRODUCTS

2.01 GENERAL SOIL MATERIALS

A. Provide borrow soil materials when sufficient satisfactory soil materials are not available from on-site excavations.

1. Satisfactory Soils: ASTM D2487 soil classification groups GW, GP, GM, SW, SP, and SM, or a combination of these group symbols; free of rock or gravel larger than 1 inch in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.

2. Unsatisfactory Soils: ASTM D2487 soil classification groups GC, SC, ML, CL, MH, CH, OL, OH, and PT, or a combination of these group symbol where clay,

organic soils, or other non-aggregate base course type materials are found in quantities that may impair shear strength, limit drainage, or cause frost heave. Also includes materials containing ash, slag, cinders, or foundry sand.

B. Poz-O-Pac Material: Unidentified quantity of material at the base of the pond is a stabilized subgrade/liner that is comprised of lime, fly ash, and aggregate. Compressive strength of the Poz-O-Pac could be between 500 to 3,000 psi.

D. Excavated Existing Fill Material: Excavated material from base of the pond between the first and second Poz-O-PacO-Pac liners that does not require disposal and may be reused as backfill, subject to Owner’s and/or Engineer’s approval.

E. Excavated Subgrade Material: Excavated material from the pond side slopes that may be reused as backfill, subject to Owner’s and/or Engineer’s approval.

F. Anchor Trench Backfill: Trench spoils free of rock or gravel larger than 1 inch in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.

2.02 RECONSTRUCTED BANK MATERIAL

A. Conform to Section 1003.01, Fine Aggregates, of IDOT Standard Specifications for Road and Bridge Construction:

1. Description: Sand or screenings;

2. Grade No. FA3 or FA5 shall be used;

3. Excavated Subgrade Material or Existing Fill Material subject to Owner’s and/or Engineer’s approval; or

4. Other materials with greater or equal characteristics with the written approval of the Owner and/or Engineer.

B. Contractor shall provide Owner and/or Engineer a representative gradation (ASTM D422) and classification (ASTM D2487) for the Cushion Layer Material two weeks prior to delivery to site.

2.03 CUSHION LAYER MATERIAL

B. Cushion Layer Material shall be obtained from on-site, or an off-site borrow source of the Contractor’s choice, and shall, at a minimum, satisfy the following specifications:

1. Conform to Section 1003.01, Fine Aggregates, of IDOT Standard Specifications for Road and Bridge Construction:

a. Description: Sand or screenings; and

b. Grade No. FA 1, FA 2, FA 3, or FA 5 shall be used

2. Excavated Subgrade Material or Existing Fill Material subject to Owner's and/or Engineer's approval; or

3. Other materials recommended by the Contractor for the specific application with the written approval of the Owner and/or Engineer.

C. Contractor shall provide Owner and/or Engineer with a representative gradation (ASTM D422) and classification (ASTM D2487) for the Cushion Layer two weeks prior to delivery to site.

2.04 WARNING LAYER MATERIAL

A. Warning Layer Material shall be obtained from an off-site borrow source of the Contractor's choice and shall, at a minimum, satisfy the following specifications:

1. Conform to Section 1004.04, Coarse Aggregate for Stabilized Subbase, of IDOT Standard Specifications for Road and Bridge Construction:

    a. Grade No. CA 6 shall be used.

    b. Material shall be angular in nature (e.g., crushed stone).

2. Other materials recommended by the Contractor for the specific application with the written approval of the Owner and/or Engineer.

B. Contractor shall provide Owner and/or Engineer with a representative gradation (ASTM D422) and classification (ASTM D2487) for the Warning Layer Material two weeks prior to delivery to site.

PART 3 - EXECUTION

3.01 PROTECTION OF UTILITIES AND STRUCTURES

A. At least 10 business days before beginning Work, coordinate utility locate with a private utility locator for Owner's private utilities near South Ash Pond 2.

B. Protect against damage existing utilities not specified for removal.

C. Locate existing underground utilities by hand or vacuum excavation methods only.

D. If unmarked utilities are encountered during excavation, stop Work, place Work in a safe condition, and notify Owner and/or Engineer.

E. Preserve and protect benchmarks and other structures. If damaged during construction, notify Owner and/or Engineer immediately. If determined by Owner and/or Engineer that the integrity of the structure is compromised, Contractor shall repair damaged benchmarks or other structures at Contractor's expense under observation of Owner and/or Engineer.

F. Protect, support, and maintain conduits, wires, pipes, or other utilities that are to remain in place during Work as indicated in the Contract Drawings.

3.02 PREPARATION

A. Contractor shall perform, as necessary, additional survey and layout to establish location, line, and grades for controlling the Work.

B. Vicinity Controls

1. Surface Water: Contractor is responsible for management of surface water and maintaining adequate berms and drainage to control surface water run-on into the South Ash Pond 2, as needed. Surface water and run-on water may be directed to the South Ash Pond 3, as needed to complete Work and as approved by Owner.

2. Erosion Controls: Contractor shall undertake erosion control measures as shown on the Contract Drawings and in accordance with the project’s Storm Water Pollution Prevention Plan (SWPPP), as presented in Appendix A. The following general practices shall be used where applicable:

   a. Minimize disturbed areas, and sequence Work to minimize exposure time.

   b. Utilize dikes, brush, straw bales, or silt fence to trap sediment.

   c. Reduce volume and velocity of water crossing disturbed areas by utilizing diversion berms, straw bales, or other facilities approved by Owner and/or Engineer.

   d. Maintain or replace erosion and sediment control measures, as necessary, to accommodate the sequencing and progression of Work (e.g., as increases in grade occur).

   e. Maintain and clean access road, as necessary.

3. Dust Controls: Dust shall be minimized at all times. Appropriate engineering controls that include using a light water spray, with or without additives approved by the Owner and/or Engineer, to minimize off-site migration of fugitive dust from stockpiles, truck routes, and other Contractor-disturbed areas.

3.03 SLOPE RECONSTRUCTION (AS NEEDED)

A. Grade and compact slopes to match pre-existing slope, approximately 3H:1V, as approved by the Owner and/or Engineer. Smooth subgrade with smooth-drum roller. Do not roll wet or saturated subgrade. The geomembrane shall be placed above the repaired areas approved by Owner and/or Engineer and Geomembrane Installer.

3.04 LINER SUBGRADE PREPARATION

A. Contractor shall remove any accumulated ash, sludge/sediment, and debris from pond by means approved by Owner and/or Engineer. Majority of the ash will be removed by Owner prior to commencement of Work. Contractor shall be responsible to manage any ash remaining as necessary to facilitate Work.

B. Load, transport, and dispose/stockpile of ash and sludge/sediment on-site as directed by Owner and/or Engineer.

C. Remove entire first layer of Poz-O-Pac liner (estimated thickness 12 inches) from base of pond, excluding the area around the pipe support foundations, as indicated on Contract Drawings. Poz-O-Pac liner may not exist in some areas at the original base elevation of 582.5 feet above mean sea level (NGVD 29 datum). Contractor shall verify base of pond elevation prior to removal of material.

D. Load, transport and dispose of Poz-O-Pac material at a disposal or recycling facility approved by Owner. An approved facility by Owner: Orange Crush, LLC in Romeoville, IL, or other approved by Owner. If necessary, the material to be stockpiled on-site, as directed by Owner. Analytical results of the Poz-O-Pac material are presented as Appendix B. Any additional laboratory sampling and waste profiling of material will be managed by Owner, if necessary. Contractor shall be responsible for handling and transporting excavated Poz-O-Pac liner to approved facility.

E. Contractor shall excavate 6 inches of Existing Fill Material from beneath first layer of Poz-O-Pac liner. Contractor shall verify final base of pond subgrade surface is at approximately 581 feet above mean sea level (NGVD 29 datum) and not exceed a 1% slope (shall be relatively flat). Second layer of Poz-O-Pac liner and/or bedrock surface shall not be exposed at the base of the pond.

F. Existing Fill Material shall be stockpiled on-site, as directed by Owner. Fill material to be reused as Cushion Material, as described in Part 3.04K and subject to Engineer and/or Owner approval.

G. Contractor shall prepare the geomembrane subgrade, including ramp surface, for installation by clearing and grubbing vegetation and removing rocks and other debris greater than 1 inch in diameter along side slopes and base of pond.

H. Over excavate soft spots, fill low spots, and trim high spots to match pre-existing slope, approximately 3 horizontal to 1 vertical (3H:1V), as approved by Engineer and/or Owner. Do not over excavate to remove unsuitable material without Owner or Engineer’s approval. Excavated subgrade material shall be stockpiled on-site, as directed by Owner and/or Engineer. Visually inspect and proof roll all areas to determine if further excavation and removal of existing subgrade materials is required. Where clay, organic soils, or other non-aggregate type materials are found in quantities that may impair shear strength, limit drainage, or cause frost heave, these materials shall be removed to a depth of 12 inches below the subgrade surface.

I. Backfill repair areas with Reconstructed Bank Material approved by Owner and/or Engineer. Grade and compact backfill to match pre-existing slope, approximately 3 horizontal to 1 vertical (3H:1V), as approved by the Owner and/or Engineer. Smooth subgrade with smooth-drum compactor. Do not roll wet or saturated subgrade. The geomembrane liner shall be placed above the repaired, backfilled areas approved by Owner and/or Engineer and Geomembrane Installer.

J. Contractor shall notify Engineer and/or Owner of unexpected subgrade conditions.

K. Place Cushion Material at base of pipe supports to provide a smooth transition between the base of the pond and pipe support structure for placement of the geomembrane liner, as shown on the Contract Drawings.

L. Reconstruct liner subgrade damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by the Owner and/or Engineer and Geomembrane Installer.

M. The surface of the subgrade shall be acceptable to the Owner and/or Engineer and Geomembrane Installer, and graded so it is free of irregularities, protrusions, loose soil, and abrupt changes in grade. Rocks with sharp protrusions and rocks or other debris greater than 1 inch in any dimension shall be removed.

N. Vegetation, rocks, and other debris removed during subgrade preparation shall be loaded and transported to a disposal facility approved by the Owner and/or Engineer.

3.05 COMPACTION OF SOIL BACKFILLS AND FILLS

A. Reconstructed Bank Material for subgrade preparation unless otherwise specified:

1. Place in layers essentially parallel with the side-slopes or pond bottom in lifts not more than 6 inches in depth after compaction by heavy equipment (min. 25,000 pounds, static weight), and not more than 4 inches in loose depth for material compacted by hand-operated tampers.

2. Place evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.

3. Compact to at least 90 percent as determined by the Modified Proctor test (ASTM D1557) within plus or minus two percentage points of the optimum moisture content (OMC).

3.06 FIELD QUALITY CONTROL

A. Allow Geotechnical Field Technician to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements.

B. Geotechnical Laboratory and Field Testing of Backfill areas with Reconstructed Bank Material (Table 3):

1. Contractor shall have the following laboratory and field testing performed on the Reconstructed Bank Material:

        a. <u>Geotechnical Laboratory testing prior to start of work</u>: at least one representative, composite sample of imported Reconstructed Bank Material. Samples shall be tested for grain size (ASTM D422), classification (ASTM D2487), moisture content (ASTM D2216), and Modified Proctor (ASTM D1557). Test results shall be submitted to the Engineer two weeks prior to the start of bank reconstruction.

        b. <u>Geotechnical Field Testing during bank reconstruction</u>: in-place density and moisture content (ASTM D6938) tests on a 25-foot grid for every 6-inch lift of Reconstructed Bank Material placed, with at least five tests performed per lift. 25-foot grid shall be offset for each lift. Additional field tests shall be collected at the discretion of the Geotechnical Field Technician and/or Engineer. All related reports and test findings shall be sent directly to the Engineer and Contractor within 24 hours of test completion.

    2. Geotechnical field testing shall be performed by Geotechnical Field Technician under contract with Contractor and in a manner that minimizes delays in performance of work.

C. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil to depth required; recompact and retest until specified compaction is obtained.

D. Field samples shall be collected at random locations selected by the Engineer. If additional field tests are necessary, in the opinion of the Engineer, such tests shall be made.

3.07 ANCHOR TRENCH

A. Excavate to required alignment and dimensions indicated on the Contract Drawings. Where feasible, Contractor shall place anchor trench at least 2 feet laterally from top of side slopes. If not feasible, Contractor shall submit proposed alignment to Owner and/or Engineer for approval.

B. Contractor shall not excavate more than the amount of anchor trench required for one day of geosynthetics deployment, unless otherwise specified by the Owner and/or Engineer. Rounded corners shall be provided in the trenches where the geosynthetics enter the trench to allow them to be uniformly supported by the subgrade and to avoid sharp bends.

C. Remove water that may accumulate in trench. Water shall be pumped to South Ash Pond 3 (active pond), or as directed by Owner and/or Engineer.

D. Owner and/or Engineer may limit amount of open trench where field conditions dictate.

E. Excavations shall be backfilled with trench spoils free of rock/debris no greater than 1 inch in any dimension, as directed by Owner and/or Engineer. Care shall be taken when backfilling to prevent any damage to Geomembrane or other geosynthetics that may be placed prior to backfilling.

F. Anchor trench backfill shall be mechanically compacted to a hard durable surface with no evidence of pumping or ponding of water. Backfill shall be compacted to the degree that no further appreciable consolidation is evident under the action of compaction equipment. The geosynthetics shall not be supported by loose soils in anchor trenches.

G. Anchoring, backfilling, and compaction of anchor trench will be observed by Owner and/or Engineer.

3.08 PLACEMENT OF CUSHION AND WARNING LAYER MATERIALS

A. Prior to placement of the Cushion and Warning Layer Materials, the Owner and/or Engineer and Geomembrane Installer shall verify completion of geomembrane installation and provide Contractor notification to proceed with placement of Cushion and Warning Layers.

B. Contractor shall place Cushion Layer Material over the upper 16-oz/sy nonwoven geotextile to achieve a minimum 12-inch thickness, as indicated on Contract Drawings..

C. Contractor shall place Warning Layer Material over the Cushion Layer Material to achieve a minimum 6-inch thickness, as indicated on Contract Drawings.

D. Cushion and Warning Layer Materials shall not be placed directly on the installed geomembrane.

E. Place materials evenly on all sides of structures to required thickness and elevation.

F. Apply the following general criteria for covering of the 16-oz/sy nonwoven geotextile and geomembrane:

1. Do not place soils on the geosynthetics at an ambient temperature below 32 degrees F, (0 degrees C) nor above 104 degrees F (40 degrees C), unless otherwise specified.

2. Do not drive equipment used for placing soil directly on the geotextile / geomembrane.

3. A minimum thickness of 1 foot of soil shall be maintained between tracked equipment and the geomembrane.

4. Damage to the geomembrane resulting from placement of soil shall be repaired in accordance with Section 02600 by the Geomembrane Installer at the Contractor's expense.

5. Do not push soils down slope. Soil shall be placed over the geomembrane starting from base of the slope and up to the elevation required by this Section and/or the Contract Drawings.

3.09 RAMP CONSTRUCTION

A. Following installation of 16-oz/sy nonwoven geotextile and geomembrane, and concrete-filled Geocell, Contractor shall place Warning Layer material to achieve 6-inch thickness over the concrete-filled Geocell. Concrete shall have cured for at least 24 hours prior to placement of Warning Layer material.

B. The final ramp surface shall maintain 6H:1V slope toward the base of the ramp, as indicated on Contract Drawings.

C. Compaction of Warning Layer material shall be conducted without vibratory action, if equipped. Materials shall be compacted to the degree that no further appreciable consolidation is evident under the action of heavy-construction equipment.

3.10 GUARDRAIL (OPTION)

A. Furnish and install guardrails along edge of pond, as shown on Contract Drawings and as directed by Owner based on field conditions. Guardrails are to be placed along the outside edge of the geomembrane anchor trench and no more than 5 feet from the top of pond slope. Access road between South Ash Ponds 2 and 3 shall be no less than 15 feet wide between installed guardrails. Guardrails sections shall be placed every 20 feet, as shown on Contract Drawings and as approved by Owner and/or Engineer.

B. Drill approximately 44 inch deep hole every 12 feet, 6 inches at locations shown on Contract Drawings. Install 6 inch x 8.5 inch x 6 feet steel post in each hole.

C. Attach 12 feet, 6 inch or 25-foot length, 12 gauge steel W-Beam guardrail to posts. The finished guardrail height shall be 27 inches above the ground surface, as shown on Contract Drawings. Secure guardrail to post in accordance with manufacture’s requirements/instructions.

D. Flared end sections shall be installed at each end of guardrail.

3.11 BACKFILLING, GENERAL

A. Material used to construct surface water diversion berms, as needed, may be reused for backfill, as directed by the Owner and/or Engineer.

B. Imported backfill materials shall be pre-approved by the Owner and/or Engineer before delivery to the site in accordance with this Section.

C. Materials placed that do not conform to the Contract Documents, shall be re-worked or removed. Replacement material and fill surfaces upon which it is placed shall conform to all requirements of this specification. All reworking or removal and replacement will be performed at Contractor’s expense.

D. Mechanical tamping shall be done in no greater than 6-inch thick lifts.

3.12 STOCKPILING, GENERAL

A. Stockpile materials on-site at locations specified by Owner.

B. Stockpile in sufficient quantities to meet project schedule and requirements.

C. Separate differing materials and stockpile separately to prevent mixing, as directed by Owner and/or Engineer.

D. Direct surface water away from stockpiles to prevent erosion or deterioration of materials, as needed.

3.13 COMPACTION

A. <u>Warning Layer Materials</u>: Compact Warning Layer Material with smooth-drum roller to achieve a hard, durable surface with no evidence of pumping or ponding of water. Materials shall be compacted to the degree that no further appreciable consolidation is evident under the action of compaction equipment. Soft areas or areas exhibiting pumping or excess water shall be reconditioned and replaced.

3.14 SOIL MOISTURE CONTROL

A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.

    1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.

    2. Remove and replace, or scarify and air dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

3.15 PROTECTION

A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

B. Repair and re-establish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.

    1. Scarify or remove and replace soil material to depth as directed by Owner and/or Engineer, reshape and recompact.

C. Where settling occurs before Project completion, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.

D. Restore appearance, quality, and condition of finished surfacing to match adjacent Work, and eliminate evidence of restoration to the greatest extent possible.

3.16 SITE RESTORATION AND CLEANUP

A. Remove surplus soil and waste material, including unsatisfactory soil, trash, and debris, and transport off-site for disposal as directed by the Owner.

B. Restore pavement, base course, topsoil, landscaping, and utilities that are disturbed during the performance of the Work to preconstruction condition.

C. Temporary erosion control measures shall be removed.

D. Contractor shall correct, at no expense to the Owner, any damage to buildings, telephone or other cables, overhead and underground utilities, or their structures as a result of his construction, whether or not the item is shown on the Contract Drawings.

E. All Contractor equipment and materials shall be removed from the site.

END OF SECTION

SECTION 02600
HIGH DENSITY POLYETHYLENE (HDPE) GEOMEMBRANE AND NONWOVEN GEOTEXTILE

PART 1 - GENERAL

1.01 WORK INCLUDES

A. Furnish all labor, materials, tools, supervision, transportation, and installation equipment necessary for installation of 60-mil High Density Polyethylene (HDPE) geomembrane and 16 oz/sy nonwoven geotextile, as specified herein, and as shown on Contract Drawings.

B. Requirements for performance of an electrical leak location survey for post-geomembrane installation performance for a single geomembrane covered with earth materials and underlain by earth materials.

1.02 REFERENCE STANDARDS

A. ASTM D5641 – Standard Practice for Geomembrane Seam Evaluation by Vacuum Chamber

B. ASTM D5820 – Standard Practice for Pressurized Air Channel Evaluation of Dual Seamed Geomembranes

C. ASTM D6365 – Standard Practice for the Nondestructive Testing of Geomembrane Seams using the Spark Test

D. ASTM D6392 –Standard Test Method for Determining the Integrity of Nonreinforced Geomembrane Seams Produced Using Thermo-Fusion Methods.

D. ASTM D7007 - Standard Practices for Electrical Methods for Locating Leaks in Geomembranes Covered with Water or Earth Materials.

E. GRI Test Method, GM 13 - Test Methods, Test Properties and Testing Frequency for High Density Polyethylene (HDPE) Smooth and Textured Geomembranes

F. GRI Test Method, GM 14 – Selecting Variable Intervals for Taking Geomembrane Destructive Seam Samples Using the Method of Attributes.

G. GRI Test Method, GM 19 – Seam Strength and Related Properties of Thermally Bonded Polyolefin Geomembranes.

H. GRI Test Method GT12(a) - ASTM Version - Test Methods and Properties for Nonwoven Geotextiles Used as Protection (or Cushioning) Materials.

1.03 DEFINITIONS

A. Installer: hired by Contractor responsible for field handling, transporting, storing, deploying, seaming, and testing of the geomembrane seams and installation of the nonwoven geotextile.

B. Geosynthetic Manufacturer: A company that manufactures geosynthetics from raw materials.

C. Leak Location Contractor: hired by Contractor and responsible for locating potential holes in the installed geomembrane using electrical methods.

D. Geosynthetic Quality Assurance Laboratory (Testing Laboratory): Laboratory, independent from the Owner, Manufacturer, and Installer responsible for conducting laboratory tests on samples of geosynthetics obtained at the site or during manufacturing, usually under the direction of the Owner.

E. Lot: A quantity of resin (usually the capacity of one rail car) used in the manufacture of geosynthetics. Finished roll will be identified by a roll number traceable to the resin lot used.

F. Resin Supplier: selected by Geosynthetic Manufacturer to provide resin used in manufacturing geomembrane.

G. Panel: Unit area of a geomembrane that will be seamed in the field that is larger than 100ft^2.

H. Patch: Unit area of a geomembrane that will be seamed in the field that is less than 100ft^2.

I. Subgrade Surface: Soil Layer surface which immediately underlies the geosynthetic material(s).

1.04 QUALITY ASSURANCE

A. Qualifications:

1. Geosynthetic Manufacturer shall have a minimum of 5 years of continuous experience manufacturing HDPE geomembrane totaling 2,000,000 square feet.

2. Installer:

    a. 5 years of continuous experience in installation of HDPE geomembrane.

    b. Experience totaling a minimum of 5,000,000 square feet of installed HDPE geomembrane on some combination of at least 10 completed facilities.

    c. Personnel performing seaming operations qualified by experience or by successfully passing seaming tests. Master Seamer shall have experience seaming a minimum of 3,000,000 square feet of geomembrane using same type of seaming apparatus to be used on this project.

d. Installers that are qualified and approved by Engineer are listed below:

i. Clean Air and Water Systems
Dousman, WI
Brain McKeown
262-965-4366

3. Leak Location Contractor:

a. Three years of continuous experience in performing leak location surveys using electrical methods.

b. Experience totaling a minimum of 2,000,000 square feet of geomembrane leak location surveys on some combination of at least 5 completed facilities.

c. Personnel performing survey qualified by experience with at least 2 years of geomembrane testing experience using the leak location survey electrical method.

d. Leak Location Contractors that are qualified and approved by Engineer are listed below:

i. Leak Location Services, Inc.
San Antonio, TX
210-408-1241

ii. Or other approved by Owner and/or Engineer.

B. Quality Assurance Program:

1. Geosynthetic Manufacturer and Geomembrane Installer shall conform with requirements of these Technical Specifications.

2. The Owner and/or Engineer may document geosynthetic installation including panel placement, seaming, pre-qualification seam testing, non-destructive seam and repair testing, repair size and locations, and weather conditions, as applicable.

3. The Owner may engage and pay for the services of Engineer and QA Laboratory to monitor geosynthetic installation.

1.05 SUBMITTALS

A. Prior to project start Installer to submit the following to Owner and/or Engineer in accordance with Section 01300, Submittals:

1. Raw Materials:
    a. Name of Resin Supplier, location of supplier’s production plant(s), resin brand name, and product number.
    b. Source and nature of plasticizers, fillers, carbon black, and any other additives along with their percent addition to geomembrane material.
    c. Test results documenting conformance with the “index properties” of GRI Test Method, GM 13.
2. Geosynthetic Manufacturer’s Certification:
    a. Written certification that Geosynthetic Manufacturer’s Quality Control Plan was fully implemented during production of geosynthetic material supplied for this project.
3. Geosynthetic Manufacturer Production Information:
    a. Corporate background information indicating compliance with qualification requirements.
    b. Quality control plan for manufacturing.
    c. Copy of quality control certificates demonstrating compliance with the quality control plan for manufacturing and the test property requirements of GRI Test method, GM 13 or GT12(a), as applicable (i.e., mill certificates).
4. Installer shall provide the Engineer a certificate stating the name of the geotextile manufacturer, product name, chemical composition of the filaments, and other pertinent information to fully describe the geotextile.

B. Prior to project start, submit the following to Owner and/or Engineer in accordance with Section 01300, Submittals:

1. Installer’s Seaming Personnel
    a. Training completed by personnel.
    b. Seaming experience for each personnel.
2. Installer’s Information:
    a. Resumes of personnel performing field seaming operation, along with pertinent experience information. Include documentation regarding which seamers are qualified to use thermal fusion welding apparatus.
    b. Installation quality control plan. Including a copy of the Installer's standard operating procedure (SOP) for operating an ATV on site,

particularly with respect to specific uses of the ATV and the prevention of damage to materials.

3. Installation panel layout diagram identifying placement of geomembrane panels, seams, and any variance or additional details which deviate from Contract Drawings or Technical Specifications. Layout shall be drawn to scale and shall be adequate for use as a construction plan. Layout shall include dimensions and pertinent seam and anchorage details.

4. Installation Sequence and Schedule shall be included as part of Construction Progress Schedule.

5. Description of seaming apparatus to be used indicating compliance with specified requirements.

C. With bid, submit the following to Owner and/or Engineer in accordance with Section 01300, Submittals

1. Leak Location Contractor’s Work Plan:

    a. Corporate background information indicating compliance with qualification requirements, if Leak Location Contractor differs from the preapproved contractor(s) listed above.

    b. List of completed facilities, totaling 2,000,000 square feet minimum of geomembrane leak location surveys on some combination of at least 5 completed facilities. Include name and purpose of facility, location, date of survey, survey method, and quantity surveyed, if Leak Location Contractor differs from the preapproved contractor(s) listed above.

    c. Resumes of personnel performing leak location survey, along with pertinent experience information.

    d. Leak Location Contractor quality control plan including description of the proposed survey methods and procedures, and field calibration procedures.

    e. Leak Location Contractor’s required site preparations to be completed to perform the proposed leak location survey, and estimated duration to complete the survey.

    f. An example of a final report (per ASTM D 7007) provided by the Leak Location Contractor following the completion of the survey.

D. During installation, submit the following to the Owner and/or Engineer:

1. Daily records/logs prepared by Installer documenting work performed, personnel involved, general working conditions, and any problems encountered or anticipated on project. Submit on a daily basis.

2. Copy of subgrade acceptance signed by Installer for areas to be covered with geosynthetics each day.

E. Within 10 working days of geosynthetic installation completion, submit the following to Owner and/or Engineer:

1. Geosynthetic installation certification that Work was performed under Installer's approved quality control plan and in substantial compliance with Technical Specifications and Contract Drawings.

2. As-built panel diagram identifying placement of geomembrane panels, seams, repairs, and destructive seam sample locations.

3. Copy of warranty for material (including factory seams) and installation covering both for a period of 2 years from the date of substantial completion.

F. The Owner and/or Engineer will review and inspect geosynthetic installation upon completion of all Work specified in this Section. Deficiencies noted shall be corrected at no additional cost to the Owner.

G. The Owner and/or Engineer will provide written final acceptance of the geosynthetic installation after completion of the leak location survey. Written conditional geosynthetic installation acceptance can be provided to the Contractor prior to completion of the leak location survey when the following conditions are satisfied, if necessary, and requested by the Contractor:

1. The entire geosynthetic installation is completed or any pre-determined subsection if the project is phased.

2. All installation quality assurance/control documentation has been completed and submitted to the Owner and/or Engineer.

3. Verification of the adequacy of all field seams, repairs, and associated testing is complete.

H. Within 14 days of completion of the leak location survey, submit final written report (per ASTM D 7007) of the leak location survey provided by Leak Location Contractor.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Transportation:

1. Geosynthetic rolls shall be transported, unloaded and handled at the job site in accordance with manufacturer recommendations. Damaged material may be rejected by the Owner and/or Engineer.

B. On-Site Storage:

1. Geosynthetic rolls which have been delivered to job site shall be unloaded and stored in original, unopened packaging in a secure location, determined by Owner and/or Engineer.

2. Store geosynthetic rolls to ensure adequate protection against exposure to the following:

    a. Equipment;

    b. Strong oxidizing chemicals, acids, or bases;

    c. Flames, including welding sparks;

    d. Temperatures in excess of 160 deg. F;

    e. Dust;

    f. Ultraviolet radiation (i.e. sunlight); and

    g. Inclement weather.

C. On-Site Handling:

1. Handle rolls per Geomembrane Manufacturer's recommendations and as necessary to prevent damage.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Geotextile to be used for cushioning above and below geomembrane shall be polyester or polypropylene, nonwoven needle punched fabric, and shall conform to the following requirements:

GEOTEXTILE PROPERTIES

Property	Units	Value	Test	Criterion
Mass Per Unit Area	oz/yd^2	16	ASTM D5261	MARV
Puncture Strength	lb	170	ASTM D4833	MARV
Trapezoid Tear	lb	145	ASTM D4533	MARV
Grab Tensile Strength	lb	370	ASTM D4632	MARV
Grab Elongation	%	50	ASTM D4632	MARV
UV Resistance @500 hours	% retained	70	ASTM D4355	Minimum

B. High Density Polyethylene (HDPE) White Textured Geomembrane

1. HDPE geomembrane shall be white (one or both sides), textured (both sides), 60-mil product approved by the Owner and/or Engineer.

2. The Contractor shall submit, with the bid, written certification from the proposed Geosynthetic Manufacturer that geomembrane products proposed in the bid satisfy the following requirements:

    a. The proposed HDPE compound shall be comprised entirely of virgin materials. Compliance with this specification shall be documented in accordance with Geosynthetic Manufacturer's quality control program and submitted to the Owner and/or Engineer with the written conformance certification.

    b. The proposed Geosynthetic Manufacturer shall certify that any plasticizers, fillers, and additives incorporated into the manufacturing process for the proposed HDPE geomembrane have demonstrated acceptable performance on past projects.

    c. The proposed geomembrane shall meet the requirements of Geosynthetic Research Institute’s test method GM 13.

    d. The nominal thickness of proposed geomembrane shall be 60 mil..

    e. Geosynthetic Manufacturer that is qualified and approved by Engineer are listed below:

        i. GSE
        Houston, TX
        800-435-2008

3. Geomembrane sheets shall be visually consistent in appearance and shall contain no holes, blisters, undisbursed raw materials, or other signs of contamination by foreign material. Geomembrane must have no striations, roughness or bubbles on the surface.

C. HDPE Weld Strips

1. For cast-in-place concrete structures with HDPE weld strips, welds shall be made by a butt weld and fusing the strips together by a thermal process such as an extrusion weld, fusion weld, or equal so as to produce continuous welded seams. Shop welded seams shall show no cracks or separations.

2. During installation of the embedment strips onto the forms, there shall be no cuts made within the strips for any purpose.

D. Seaming Apparatus

1. Thermal fusion welding machines used for joining geomembrane surfaces shall be hot wedge type. These machines shall include sufficient temperature and rate-of-travel monitoring devices to allow continuous monitoring of operating conditions.

2. One spare, operable thermal fusion seaming device shall be maintained on site at all times.

E. Field Test Equipment

1. Field Tensiometer: the field tensiometer shall be calibrated within three months prior to project start date over the range of field test values. Tensiometer shall be capable of maintaining constant jaw separation rate of 2 inches per minute.

2. Air Channel Test Equipment: air channel test equipment shall consist of hoses, fittings, valves, and pressure gauge(s) needed to deliver and monitor the pressure of compressed air through an approved pressure feed device.

3. Air Compressor: the air compressor utilized for field testing shall be capable of producing and maintaining an operating pressure of at least 50 psi.

4. Vacuum Box: the vacuum box shall consist of a vacuum gage, valve, and a gasket around the edge of the open bottom needed to apply vacuum to a surface.

2.02. CONFORMANCE TESTING REQUIREMENTS

A. Geosynthetics shipped to site shall undergo conformance testing. Manufacturer’s roll certificates may be used for conformance evaluation at the option of the Owner and/or Engineer. Nonconforming material shall either be retested at the direction of the Owner and/or Engineer or removed from site and replaced at Contractor's expense.

B. Conformance Test Methods

1. Samples will be located and collected by the Owner and/or Engineer at a rate of one sample per 100,000 square feet of geomembrane delivered to site.

2. One sample will be obtained from each geomembrane production batch delivered to the site.

3 Samples shall be cut by Installer and be at least 45 square feet in size.

4. Samples shall be tested in accordance with Table 2 (HDPE Geomembrane - Textured) specified in GRI Test Method GM13.

5. Geomembrane thickness shall be measured a minimum of three times per panel during deployment to verify conformance with GRI Test Method GM13.

C. Role of Testing Laboratories

1. The Owner and/or Engineer will be responsible for acquiring samples of the geomembrane for conformance testing. The Owner or Engineer will retain an

independent, third party laboratory to perform conformance testing on samples of geomembrane.

2. Retesting of geomembrane panels by the Installer because of failure to meet any of the conformance specifications can only be authorized by the Owner and/or Engineer.

3. The Geosynthetic Manufacturer and/or Installer may perform independent tests in accordance with methods and procedures specified in GRI GM 13. Results shall not be substituted for quality assurance testing described herein.

D. Procedures for Determining Conformance Test Failures

1. If conformance test results fail to meet specifications, the roll and/or batch may be retested at the Installer’s expense using specimens from either the original roll sample or from another sample collected by the Owner and/or Engineer. Two additional tests (retests) shall be performed for each failed test procedure. Each retest shall consist of multiple specimen tests if multiple specimens are specified in the test procedure. If the results of both retests meet specifications, the roll and batch will be considered to have passed conformance testing.

2. Failure of any retest shall be cause for rejection of the entire roll or batch depending on the type of failing test. The Owner and/or Engineer reserves the right to collect samples from other rolls of a particular batch for further conformance testing. The Owner and/or Engineer may choose to accept only a portion of the batch on the basis of the results of conformance testing of samples collected from other rolls.

3. If retesting does not result in conformance with the specifications as defined in preceding paragraph, or if there are any other nonconformities with the material specifications, the Contractor shall remove the rolls from use in the project. The Contractor shall also be responsible for removal of rejected geomembrane from the site and replacement with acceptable geomembrane at no additional cost to the Owner.

PART 3 - EXECUTION

3.01 PRE-CONSTRUCTION MEETING

A. A Pre-Construction Meeting shall be held at the site to discuss and plan the details of geosynthetic installation. This meeting shall be attended by the Installer, Owner, Engineer, and the Contractor.

B. The following topics relating to geosynthetic installation shall be addressed:

1. Responsibilities of each party.

2. Lines of authority and communication.

3. Methods for documenting, reporting, and distributing documents and reports.

4. Procedures for packaging and storing archive samples.

5. Review of the schedule for all installation and quality assurance testing, including third-party testing turnaround times.

6. Review of panel layout, access and numbering systems for panels and seams including details for marking on the HDPE geomembrane.

7. Procedures and responsibilities for preparation and submittal of as-built drawings.

8. Temperature and weather limitations, installation procedures for adverse weather conditions, and defining acceptable subgrade or ambient moisture and temperature conditions for working during liner installation.

9. Subgrade conditions, dewatering responsibilities, and subgrade maintenance plan.

10. Deployment techniques including allowable subgrade for geosynthetics.

11. Procedures for covering of the geosynthetics to prevent damage.

12. Plan for minimizing wrinkles in the geomembrane.

13. Measurement and payment schedules.

14. Site health and safety procedures/protocols.

3.02 SUBGRADE PREPARATION

A. The Installer and Engineer shall visually inspect the subgrade immediately prior to geosynthetic deployment. Inspection shall verify that there are no potentially harmful foreign objects present, such as sharp rocks and other deleterious debris. Any foreign objects encountered shall be removed by Installer or Contractor. All subgrade damaged by construction equipment and deemed unsuitable for geosynthetic deployment shall be repaired prior to geosynthetic deployment. All repairs shall be approved by the Owner and/or Engineer and Installer. The responsibility for preparation, repairs, and maintenance of the subgrade shall be defined in the preconstruction meeting. The Installer shall provide the Owner and/or Engineer with written acceptance of subgrade surface over which geotextile and geomembrane is deployed (Part 1.05C*)* for each day of deployment.

3.03 GEOMEMBRANE LINER DEPLOYMENT

A. Installer shall deploy 16-oz/sy nonwoven geotextile following applicable certifications/quality control certificates listed in Part 1.05 of this section and approved by the Owner and/or Engineer. Any 16-oz/sy nonwoven geotextile placed prior to approval by the Owner and/or Engineer shall be at the sole risk of the Contractor. If geotextile installed prior to approval by the Owner and/or Engineer does not meet the requirements of this specification, it shall be removed from the site at no additional cost to the Owner.

B. Geomembrane will be deployed following installation of the geotextile and applicable certifications/quality control certificates listed in Part 1.05 of this section according to the submitted panel layout drawing as approved by the Owner and/or Engineer. The Owner and/or Engineer shall be notified of and approve any revisions or modifications to the approved panel layout drawing prior to deploying geomembrane in the area of review.

C. Adequate temporary anchoring (sand bags) that will not damage the geomembrane shall be placed on a deployed panel to prevent uplift by wind.

D. Geomembrane shall not be deployed if:

   1. Ambient temperatures are below 41 degrees F (5 degrees C) or above 104 degrees F (40 degrees C) measured six inches above geomembrane surface unless approved by the Owner and/or Engineer.

   2. Precipitation is expected or in the presence of excessive moisture or ponded water on the subgrade surface.

   3. Winds are excessive as determined by Installer in agreement with the Owner and/or Engineer.

   4. The Owner and/or Engineer will have the authority to suspend work during such conditions.

E. The Installer shall be responsible for conformance with the following requirements:

   1. Equipment utilized for installation/quality assurance testing (e.g. generators) does not damage geosynthetics. Such equipment shall have rubber tires and a ground pressure not exceeding 5 psi or total loaded weight not exceeding 750 lbs. Only equipment necessary for installation and quality assurance testing is allowed on the deployed geosynthetics.

      a. Any use of ATVs on the site must be pre-approved by the Engineer. The Installer shall submit an SOP describing how ATVs are to be used, if at all, in the deployment of geomembrane at the site. As a minimum, the following shall apply:

         i. Any damage resulting from the use of ATVs, as determined by the Engineer, shall be repaired according to the Contract Documents, at no additional cost to the Owner. If repeated repairs are required as the result of the use of ATVs operating on geosynthetic material, further use of ATVs will be prohibited.

ii. Any and all ATVs proposed to be used in the deployment of geosynthetics will be inspected by the Engineer. ATVs which are found to be leaking oil or fuel, or which in any other way exhibit the potential to damage the lining system components, will not be permitted.

iii. Any oil or fuel which leaks onto geosynthetic materials shall be thoroughly removed (cleaned) by the Installer, or the geosynthetic material shall be replaced at the discretion of the Engineer, at no additional cost to the Owner.

iv. Re-fueling of ATVs on geosynthetic materials is prohibited.

v. ATVs shall have tires with low ground pressure, typically less than 5 psi, and shall have shallow treads.

vi. ATVs shall be operated by a single operator at speeds less than 5 mph.

vii. Quick starts, stops, spinning wheels and sharp turns will not be permitted above any geosynthetic material.

2. Personnel working on geosynthetics do not damage geosynthetics [activities such as smoking or wearing damaging clothing (boots or shoes) shall not be allowed].

3. Method of deployment does not damage the geosynthetics.

4. Method of deployment minimizes wrinkles.

5. Temporary loading or anchoring does not damage the geosynthetics.

F. Installer shall place 16-oz/sy nonwoven geotextile above the geomembrane at the base of pond, as indicated on Contract Drawings. Installer shall cover the batten bar attachments with the nonwoven geotextile.

G. No vehicles shall be allowed on deployed geosynthetics other than an approved low ground pressure vehicle or equivalent.

3.04 FIELD SEAMS

A. Seam Layout

1. In general, seams shall be oriented parallel to the line of the maximum slope. In corners and at other odd-shaped geometric intersections, the number of seams should be minimized. If at all possible, seams shall not be located at low points in the subgrade unless geometry requires seaming to be done at these locations.

2. A seam numbering system compatible with the panel numbering system shall be agreed upon at the Pre-Construction Meeting.

B. Geomembrane Seaming Processes/Equipment

1. Approved processes for field seaming (panel to panel) are extrusion or hot wedge fusion-type seam methods. No other processes can be used without prior written authorization from the Owner and/or Engineer. Only equipment which has been specifically approved by make and model shall be used, if applicable.

2. The Installer will meet the following requirements regarding use, availability, and cleaning of welding equipment at job site:

    a. Intersecting hot wedge seams shall be patched using extrusion welding process.

    b. Electric generator for equipment shall be placed on a smooth base such that no damage occurs to geosynthetics. A smooth insulating plate or fabric shall be placed beneath hot equipment placed on the geosynthetics.

3. The Installer shall keep records for performance and testing of all seams.

C. Seaming Requirements/Procedures

1. Weather Conditions - Range of weather conditions under which geomembrane seaming can be performed are as follows:

    a. Unless otherwise authorized in writing by Owner and/or Engineer, no seaming shall be attempted or performed at an ambient temperature below 41 degrees F (5 degrees C) or above 104 degrees F (40 degrees C).

    b. Between ambient temperatures of 32 degrees F (0 degrees C) and 41 degrees F (5 degrees C), seaming shall follow GRI GM9 cold weather seaming guidelines. Pre-qualification seams shall be produced to determine appropriate seaming parameters and for Engineer's approval.

    c. Above 41 degrees F (5 degrees C), no special conditions will be required.

    d. Geomembrane shall be dry and protected from wind.

    e. Seaming shall not be performed during any precipitation event.

    f. Seaming shall not be performed in areas where ponded water has collected below surface of geomembrane.

2. If the Installer chooses to use methods which may allow seaming at ambient temperatures below 41 degrees F or above 104 degrees F, the Installer shall demonstrate and submit certification to Owner and/or Engineer that the methods and techniques used to perform seaming produce seams that are equivalent to seams produced at temperatures above 41 degrees F and below 104 degrees F. The Owner and/or Engineer may deny approval for use of the proposed technique regardless of demonstration results.

3. Overlapping - Geosynthetic panels shall have finished overlap as follows:

   a. Minimum of 4 inches.

   b. Insufficient overlap will be considered a failed seam.

4. Pre-qualification tests for geomembrane welding shall be conducted for each welding machine and by each seaming technician performing welding with that machine. At least one test shall be performed at the start of each work day, with tests at intervals of no greater than 5 hours and additional pre-qualification tests following work interruptions, weather changes, changes to machine settings, or as directed by the Owner and/or Engineer. Pre-qualification seams shall be made under the same conditions as the actual seams.

   a. Pre-qualification seam samples shall be 5 feet long by 1-foot wide (minimum) after seaming, with seam centered along its length. Each pre-qualification seam shall be labeled with the date, machine temperature and speed, seaming unit identifier, technician performing the test seam, and description of testing results.

   b. Seam overlap shall be in accordance with Part 3.04.C.3.

   c. Pre-qualification seams shall be inspected for proper squeeze-out, footprint pressure, and general appearance.

   d. Four specimens, each 1-inch wide, shall be cut from opposite ends of the pre-qualification seam sample by the Installer. The remainder of pre-qualification seam shall be retained by the Owner and/or Engineer and may be submitted for laboratory testing.

   e. The Installer shall complete two shear tests and two peel tests in accordance with GRI GM 19.

   f. Pre-qualification seams failed by inspection or testing may be retested at request of the Installer. If the second pre-qualification seam fails, then the seaming apparatus or seaming technique shall be disqualified from use until two consecutive, satisfactory pre-qualification seams are obtained.

5. Seam Preparation

   a. Prior to seaming, seam area shall be clean and free of moisture, dust, dirt, debris of any kind, and foreign material.

   b. Seams shall be aligned so as to minimize number of wrinkles and fishmouths.

6. General Seaming Procedures - Geomembrane

a. Fishmouths or wrinkles at seam overlaps shall be cut along ridge of the wrinkle to achieve a flat overlap. Cut fishmouths or wrinkles shall be repaired, and/or patched in accordance with Part 3.07.

b. Seaming shall extend to the outside edge of geomembrane panels including material placed in anchor trenches.

c. The intersecting thermal fusion seams shall be patched using the extrusion welding process.

7. General Seaming Procedures – Geotextile

a. Geotextile seams shall be completed by one of the following methods:

i. Heat bond, with either torch, leister, or hot-wedge welding equipment

ii. Sewing

3.05 NON-DESTRUCTIVE TESTING

A. Each field seam shall be non-destructively tested over its entire length by the Installer. Testing shall be conducted as field seaming progresses, not at completion of all seams, unless specifically agreed to by the Owner and/or Engineer in writing.

B. Vacuum Testing – shall be performed in accordance with ASTM D5641.

C. Air Pressure Testing – shall be performed in accordance with ASTM D5820, and GRI GM 6.

D. Each seam tested non-destructively shall be marked with the date of the test, name of the testing technician, length of the seam, test method, and results. The same shall also be recorded by the Owner and/or Engineer on the appropriate CQA documentation.

E. Non-Destructive Seam Test Failures

1. Seams failing non-destructive testing shall be repaired by the Installer according to Part 3.07. Seams shall be non-destructively retested. If the seam defect cannot be located, the entire section of seam affected shall be repaired or replaced.

3.06 ELECTRICICAL LEAK LOCATION SURVEY

A. Leak Location Contractor shall identify actions required by Contractor to prepare the site for the electrical leak location survey prior to placement of materials over the geosynthetics.

B. Contractor shall ensure that the cushion and warning layers, and geotextile above and below the geomembrane contains sufficient moisture to conduct a leak location survey. Typically, a moisture content of earth materials of 1% to 2% by weight is sufficient to conduct the survey. If the moisture content of the cushion layer, warning layer and subgrade is not sufficient per the requirements of the Leak Location Contractor, Contractor shall add moisture to the layers, as required.

C. Contractor shall provide electrical isolation of the batten bars and concrete structures, as requested by Leak Location Contractor.

D. Leak Location Contractor shall inspect the site prior to commencing the survey to ensure all site preparations are completed and the site conditions are appropriate for conducting the leak location survey.

E. Any discrepancy in the required site preparation detailed in the Leak Location Contractor’s Work Plan or site conditions shall be reported to the Contractor for corrective or appropriate action.

F. After the warning layer is placed and compacted, conduct a leak location survey on the warning layer material using the procedures for surveys with earth materials covering the Geomembrane as described in ASTM D 7007.

G. A leak detection sensitivity test using an artificial leak shall be conducted on the geomembrane for each set of equipment used before the equipment is used on for the leak location survey, as described in ASTM D 7007 to determine the detection distance for the survey.

H. The leak location survey shall be taken on survey lines or on a grid spaced no farther apart than twice the leak detection distance as determined in the leak detection sensitivity test.

I. The Leak Location Contractor shall inform the Owner and/or Engineer and mark the locations of all identified or indicated leaks with a flag or spray paint. The Installer shall repair the defect/hole as detailed in Part 3.07 of this Section.

3.07 DEFECTS AND REPAIRS

A. The geosynthetics shall be examined by the Installer and the Owner and/or Engineer for defects, holes, blisters, undispersed raw materials, and any signs of contamination by foreign matter. The geomembrane surface shall be swept and/or washed by the Installer if the amount of dust or mud inhibits examination. The Contractor shall provide a water truck, an operator, clean water and hoses as reasonably necessary to assist the Installer in this activity.

B. Portions of geomembrane exhibiting flaws, or failing a non-destructive or destructive (if conducted) test, shall be repaired or replaced by the Installer. Repair procedures available include:

1. Patching - used to repair holes, tears, undispersed raw materials, contamination by foreign matter, holes resulting from destructive sampling (if conducted), and locations where seam overlap is insufficient;

2. Capping - used to repair large lengths of failed seams; and

3. Additional Procedures - used upon recommendation of the Installer if agreed to by the Owner and/or Engineer.

C. Patches or caps.

1. Extend patch or cap 6 inches (minimum) beyond the edge of the defect. All patched shall be a minimum of one square foot in size.

2. Round corners of patch and/or cap with a minimum 3-inch radius.

3. Repair procedures, equipment, materials, and techniques will be approved by the Owner and/or Engineer prior to repair.

4. Geomembrane below large caps shall be appropriately cut to avoid water or gas collection between two sheets.

D. The Installer shall mark on the geomembrane (using a non-puncturing writing utensil), repair date, time, and personnel involved.

E. Each repair shall be non-destructively tested in accordance with Part 3.05.

F. Repairs which fail testing shall be redone and retested until a passing result is obtained. The Installer will perform non-destructive testing on repairs and will document retesting of repairs.

G. The Installer will document repairs, repair testing, and retesting results.

H. The Installer shall cut and seam wrinkles which may adversely affect long-term integrity of the geomembrane, hinder subsequent construction of overlying layers, or impede drainage off of the geomembrane after it is covered by soil. Seaming shall be done in accordance with procedures described in Parts 3.04(B) and 3.04(C), and it shall be subject to test provisions of Parts 3.05 (non-destructive testing).

3.08 PROTRUSIONS AND CONNECTIONS TO GEOMEMBRANE

A. If required, the Installer shall install geosynthetics around utility poles, guy wires, marker posts, concrete structures, and other structures according to the Contract Drawings and the following requirements:

1. Use minimum 2-ft long geomembrane pipe boots and steel clamps to seal the geomembrane around pole or structure.

2. Use welding procedures to seam the geomembrane boot or weld strip to the geomembrane in accordance with the instruction of the manufacture.

    a. Weld strip joints shall be butt-welded together to provide continuous support for the HDPE Liner and a secure seal or by some other method acceptable to the Engineer to create a continuous, water-tight weld strip.

    b. Weld strip to be attached to the inside of the concrete form with finishing nails prior to concrete placement. Finishing nails shall be 1-inch or smaller. The nails to be flush with the back of the weld strip to allow for easy removal when the forms are removed.

c. After the concrete has set and the forms are removed, the finishing nails that remain in the weld strip shall be removed, and the resulting holes clearly marked. If concrete gets between the weld strip and the form, the concrete shall be chipped away to reveal the face of the weld strip.

3. Seaming performed on and around penetrations, and other appurtenances shall be non-destructively tested using the spark test method (ASTM D6365).

3.09 SURVEY DOCUMENTATION

A. Prior to covering the geomembrane, the Installer shall provide the Contractor, Owner and/or Engineer with 24-hour notification to conduct a survey. The Contractor shall survey the location of all seams (at panel corners and seam terminations in the anchor trench), and repairs. The Contractor shall provide survey data to the Owner and/or Engineer within two working days of survey completion and in accordance with Section 01050.

3.10 DAILY FIELD INSTALLATION REPORTS

A. At the beginning of each day, the Installer shall provide the Owner and/or Engineer with a report for all work completed the previous day.

B. The Daily Field Installation Report shall include the following:

1. The total amount and location of geosynthetics placed.

2. The total length and location of seams completed, technician name and welding unit numbers.

3. A drawing or sketch depicting the geomembrane installed the previous day including the panel number, seam number, and locations of non-destructive and destructive testing (if conducted).

4. Results of pre-qualification test seams.

5. Results of non-destructive testing.

C. Destructive test results (if conducted) shall be reported within 48 hours or prior to covering the geomembrane, whichever is practical.

END OF SECTION

SECTION 03300
CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.01 DESCRIPTION

A. Provide labor, materials, equipment, and incidentals necessary to furnish and install cast-in-place concrete as specified and as shown on contract drawings.

1.02 REFERENCES

A. American Concrete Institute (ACI), latest edition

1. ACI 211.1: Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete
2. ACI 214R: Recommended Practice for Evaluation of Strength Test Results of Concrete
3. ACI 301: Standard Specifications for Structural Concrete
4. ACI 304R: Guide for Measuring, Mixing, Transporting and Placing Concrete
5. ACI 304.2R: Placing Concrete by Pumping Methods
6. ACI 305R: Hot Weather Concreting
7. ACI 306R: Cold Weather Concreting
8. ACI 308: Standard Practice for Curing Concrete
9. ACI 309R: Guide for Consolidation of Concrete
10. ACI 311.4R: Guide for Concrete Inspection
11. ACI 318: Building Code Requirements for Structural Concrete

B. ASTM International, latest edition

1. ASTM C31: Standard Practice for Making and Curing Concrete Test Specimens in the Field
2. ASTM C33: Standard Specification for Concrete Aggregates
3. ASTM C39: Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
4. ASTM C40: Standard Test Method for Organic Impurities in Fine Aggregates for Concrete

5. ASTM C42: Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
6. ASTM C88: Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
7. ASTM C94: Standard Specification for Ready-Mixed Concrete
8. ASTM C136: Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
9. ASTM C138: Standard Test Method for Unit Weight, Yield, and Air Content (Gravimetric) of Concrete
10. ASTM C150: Standard Specification for Portland Cement
11. ASTM C171: Standard Specification for Sheet Materials for Curing Concrete
12. ASTM C172: Standard Practice for Sampling Freshly Mixed Concrete
13. ASTM C192: Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory
14. ASTM C231: Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
15. ASTM C260: Standard Specification for Air-Entraining Admixtures for Concrete
16. ASTM C289: Standard Test Method for Potential Alkali-Silica Reactivity of Aggregates (Chemical Method)
17. ASTM C295: Standard Guide for Petrographic Examination of Aggregates for Concrete
18. ASTM C309: Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
19. ASTM C311: Standard Test Methods for Sampling and Testing Fly Ash or Natural Pozzolans for Use as a Mineral Admixture in Portland Cement Concrete
20. ASTM C494: Standard Specification for Chemical Admixtures for Concrete
21. ASTM C618: Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete
22. ASTM C881: Standard Test Method for Epoxy Resin Base Bonding Systems for Concrete
23. ASTM C882: Standard Test Method for Bond Strength of Epoxy Resin Systems Used with Concrete by Slant Shear

24. ASTM C1017: Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete

25. ASTM C1064: Standard Test Method for Temperature of Freshly Mixed Portland Cement Concrete

26. ASTM C1107: Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)

27. ASTM D75: Standard Practice for Sampling Aggregates

28. ASTM E329: Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials used in Construction

C. American Association of State Highway and Transportation Officials (AASHTO), latest edition

    1. AASHTO M182: Standard Specification for Burlap Cloth Made from Jute or Kenaf and Cotton Mats

1.03 SUBMITTALS

A. Two weeks prior to delivery, submit the following product data:

    1. Manufacturer's specifications and instructions including Material safety Data Sheets (MSDS) for admixtures, non-shrink non-metallic grout, and curing materials. Manufacturer's certification of compatibility of all admixtures.

    2. For commercially manufactured grout, include catalogue cuts, technical data, storage requirements, product life, working time after mixing, temperature considerations, conformity to referenced ASTM standards, and Material Safety Data Sheet.

B. Two weeks prior to delivery, submit the following certification:

    1. Provide certificate that cement used complies with ASTM C150 and these specifications.

    2. Provide certificates that aggregates comply with ASTM C33. Submit gradation analysis with concrete mix designs.

    3. Provide certificate of compliance with these specifications from the manufacturer of the concrete admixtures.

    4. For each formulation of concrete proposed, prepare mix designs in accordance with ACI 318, Chapters 4 and 5, except as modified herein. Submit mix design for review by the Engineer at least 2 weeks before placing of any concrete.

    5. Proposed special procedures for protection of concrete under wet weather placement conditions.

6. Proposed special procedures for protection and curing of concrete under hot and cold weather conditions.

7. Independent testing agency ACI Concrete Field Technician, Grade I, or equivalent certification to perform concrete quality testing and inspection.

C. Manufacturers' Instructions

1. Provide epoxy bonding compound manufacturer's specific instructions for use. Provide manufacturer's data sheets as to suitability of product to meet job requirements with regard to surface, pot life, set time, vertical or horizontal application, and forming restrictions.

D. Within 24 hours of test completion, submit the following Quality Control/Assurance Submittals:

1. Provide delivery tickets for ready-mix concrete or weighmasters certificate per ASTM C94, including weights of cement and each size aggregate and amount of water added at the plant and record of pours. Record the amount of water added on the job on the delivery ticket. Water added at the plant shall account for moisture in both coarse and fine aggregate.

2. Provide Concrete Quality Test results following analysis to the Engineer.

1.04 QUALITY ASSURANCE

A. Unless otherwise indicated, materials, workmanship, and practices shall conform to the following standards:

1. ACI 301, “Structural Concrete for Buildings”

2. ACI 318, “Building Code Requirements for Reinforced Concrete”

B. Where provisions of pertinent codes and standards conflict with this specification, the more stringent provisions govern.

C. Concrete not meeting the minimum specified 28-day design strength shall be cause for rejection and removal from the work.

D. Perform concrete work in conformance with ACI 301 unless otherwise specified.

E. Do not use admixtures, including calcium chloride, which will cause accelerated setting of cement in concrete.

F. Grout manufacturer to have a minimum of 5-years experience in the production and use of the type of grout proposed for the Work.

G. Do not place concrete until design mix, material tests, and trial concrete batch mix compression test results are accepted by the Engineer.

H. Employ an independent testing laboratory, acceptable to the Engineer, to develop concrete mix designs and testing. Concrete testing shall be performed by an ACI Concrete Field Technician, Grade I, or equivalent.

I. Employ an independent testing laboratory, to test conformity of materials to specifications. Concrete and grout testing shall be performed by an ACI Concrete Field Technician, Grade I, or equivalent. Allow free access to obtain test samples.

J. Methods of Sampling and Testing

  1. Fresh Concrete Sampling: ASTM C172
  2. Specimen Preparation: ASTM C31
  3. Compressive Strength: ASTM C39
  4. Air Content: ASTM C231
  5. Slump: ASTM C143
  6. Temperature: ASTM C1064
  7. Unit Weight: ASTM C138
  8. Obtaining Drilled Cores: ASTM C42

K. Acceptance of Structure: Acceptance of completed concrete work requires conformance with dimensional tolerances, appearance, and strength as indicated or specified.

L. Hot weather concrete to conform to ACI 305R and as specified herein.

M. Cold weather concrete to conform to ACI 306R and as specified herein.

N. Reject concrete delivered to job site that exceeds the time limit or temperature limitations specified.

O. Do not place concrete in water or on frozen or unstable ground.

P. Workability

  1. Concrete shall be of such consistency and composition that it can be worked readily into the forms and around the reinforcement without excessive vibrating and without permitting the materials to segregate or free water to collect on the surface.

  2. Adjust the proportions to secure a plastic, cohesive mixture, and one that is within the specified slump range.

  3. To avoid unnecessary changes in consistency, obtain the aggregate from a source with uniform quality, moisture content, and grading. Handle materials to minimize variations in moisture content that would interfere with production of concrete of the established degree of uniformity and slump.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver concrete to discharge locations in watertight agitator or mixer trucks without altering the specified properties of water-cement ratio, slump, air entrainment, temperature, and homogeneity.

B. Reject concrete not conforming to specification, unsuitable for placement, exceeding the time or temperature limitations, or not having a complete delivery batch ticket.

C. Deliver grout materials to the jobsite in original, unopened packages, clearly labeled with the manufacturers name, product identification, batch numbers, and printed instructions.

D. Store grout materials in accordance with the manufacturer's recommendations. Total storage time from date of manufacture to date of installation shall be limited to six months or the manufacturer's recommended storage time, whichever is less.

E. Reject grout material that becomes damp, lumpy or otherwise unacceptable and immediately remove from the site and replace with acceptable material at no cost to the Owner.

F. Deliver grouts as pre-blended, prepackaged mixes requiring only the addition of water.

1.06 SITE CONDITIONS

A. Do not place concrete until conditions and facilities for making and curing control test specimens are in compliance with ASTM C 31 and as specified herein.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Cement

1. Portland Cement, ASTM C150, Type II.

2. Use only one brand of cement in any individual structure. Use no cement that has become damaged, partially set, lumpy, or caked. Reject the entire contents of the sack or container that contains such cement. Use no salvaged or reclaimed cement.

3. Maximum tricalcium aluminate shall not exceed 8 percent. The maximum percent alkalis shall not exceed 0.6 percent.

B. Fly Ash

1. Provide fly ash conforming to the following requirements:

a. Class F fly ash conforming to ASTM C618 for chemical and physical properties.

b. Supplemental requirements in percent

        i. Maximum carbon content: 3 percent
        ii. Maximum sulfur trioxide ($S0_3$) content: 4 percent
        iii. Maximum loss on ignition: 3 percent
        iv. Maximum water requirement (as a percent of control): 100 percent
        v. Fineness, maximum retained on No. 325 sieve: 25 percent

C. Fine Aggregates

    1. Clean, sharp, natural sand conforming to requirements of ASTM C33 with a fineness modulus between 2.5 and 3.0.

D. Coarse Aggregate

    1. Well graded crushed stone, natural rock conforming to requirements of ASTM C33.
    2. Limit deleterious substances in accordance with ASTM C33, Table 3. Severe Weathering Regions, limit clay lumps not to exceed 1.0 percent by weight, and limit loss when tested for soundness using magnesium sulfate to 12 percent.

E. Water and Ice

    1. Use water and ice free from injurious amounts of oil, acid, alkali, salt, organic matter, or other deleterious substances and conform to requirements of ASTM C94.
    2. Water shall not contain more than 500 mg/L of chlorides or more than 500 mg/L of sulfate.
    3. Heat or cool water to obtain concrete temperatures specified, and in conformance with ACI 305R and ACI 306R.

F. Concrete Admixtures

    1. Maintain compressive strength and maximum water-cement ratios specified in Table 03300-1 when using admixtures. Include admixtures in solution form in the water-cement ratio calculations.
    2. Do not use any admixture that contains chlorides or other corrosive elements in any concrete. Admixtures shall be nontoxic after 30 days.
    3. Use admixtures in compliance with the manufacturer's printed instructions. The manufacturer shall certify the compatibility of multiple admixtures used in the same mix.
    4. Do not use admixtures in greater dosages than recommended by manufacturer.

5. Air Entrainment
   a. An air-entraining admixture conforming to ASTM C260
   b. Products
      i. BASF Corporation; MB-AE 90
      ii. Sika Corporation, AER
      iii. Or accepted equivalent product
   c. Adjust the admixture content to accommodate fly ash or pozzolan requirements, and other admixtures when used, in order to obtain the specified air content.
6. Water Reducing
   a. A water-reducing admixture conforming to ASTM C494, Type A and compatible with the air-entraining admixtures. The amount of admixture added to the concrete shall be in accordance with the manufacturer's recommendations.
   b. Products
      i. BASF Corporation; Polyheed Series
      ii. Sika Corporation, Plastocrete 161
      iii. WR Grace & Co.; Darex II-AEA
      iv. Euclid Chemical Company; Eucon NW
      v. Or accepted equivalent product
7. High-Range Water-Reducing Admixture (Superplasticizer)
   a. A High-Range water-reducing admixture conforming to ASTM C494, Type F or ASTM C1017, Type I.
   b. Products
      i. BASF Corporation; Glenium Series
      ii. WR Grace & Co.; Daracem 100
      iii. Euclid Chemical company; Eucon SPC
      iv. Or accepted equivalent product

G. Non-shrink Grout

1. Non-shrink grout shall be a high precision, fluid, extended working time grout. The minimum 28-day compressive strength shall be 7,500 psi (50 MPa), when mixed at a fluid consistency.

2. Grout shall have an extended working time of 30 minutes minimum when mixed to a fluid consistency as defined in ASTM C827 at temperature extremes of 45 to 90 degrees F (7 to 32 degrees C) in accordance with ASTM C1107.

3. Non-shrink grouts shall meet the requirements of ASTM C1107; Grade B or C when tested using the amount of water needed to achieve fluid consistency per ASTM C939.

4. The grout when tested shall not bleed or segregate at maximum allowed water.

5. Products

   a. Master Builders, Inc.; Masterflow 928

   b. The Euclid Chemical Co.; Hi-Flow Grout

   c. Sika Corp.; SikaGrout 212

   d. Or acceptable equivalent product

H. Epoxy Bonding Agent

1. Epoxy bonding agent shall conform to ASTM C881 Type I, II, IV or V; Grade 2 for epoxy resin adhesives. The class of epoxy bonding agent shall be suitable for ambient and substrate temperatures.

2. Products

   a. Sika Corp.; Sikadur 32

   b. Euclid Chemical Company; Duralcrete

   c. BASF Corporation, Concresive Liquid LPL

   d. Or accepted equivalent product

I. Curing Compound

1. Liquid form, which will form impervious membrane over, exposed surface of concrete when applied to fresh concrete by means of spray gun. Use Type l-D compound with red fugitive dye, Class B, having 18 percent minimum solids conforming to ASTM C309.

2. Products

   a. BASF Building Systems; Kure 1315

b. Euclid Chemical Company; Super Diamond Clear VOX

c. W. R. Meadows, Inc.; VOCOMP-30

d. Dayton Superior Corp; Safe Cure and Seal 30 percent

e. Or accepted equivalent product

J. Burlap Mats

1. Conform to AASHTO M182

K. Sisal-Kraft Paper and Polyethylene Sheets for Curing

1. Conform to ASTM C171

2.02 MIXES

A. Conform to ASTM C94, except as modified by these specifications.

B. Air content as determined by ASTM C231

1. 6 ± 1 ½ percent for concrete using ¾ inch or 1 inch maximum aggregate size.

C. Provide concrete with the following compressive strengths at 28 days and proportion it for strength and quality requirements in accordance with ACI 318. The resulting mix shall not conflict with limiting values specified in Table 03300-1.

Table 03300-1

Class	Type of Work	28-day Minimum Compressive Strength, psi [MPa]	Minimum Cementitious Content, lbs per CY	Maximum Water/ Cement Ratio
A	Concrete for all structures and concrete not otherwise specified	4,000 [28]	560	0.44

D. Measure slump in accordance with ASTM C143:

1. Proportion and produce the concrete to have a maximum slump of 4 inches. A tolerance of up to 1 inch above the indicated maximum is allowed for individual batches provided the average for all batches or the most recent 10 batches tested, whichever is fewer, does not exceed the maximum limit. Concrete of lower than usual slump may be used provided it is properly placed and consolidated.

2. Mixes containing water reducers shall have a maximum slump of 6 inches after the addition of a mid-range water reducer and maximum slump of 8 inches after the addition of a high range water reducer.

E. Pozzolan Content

1. Fly ash shall not exceed 20 percent of the total cementitious content.

F. Aggregate Size

1. Aggregate size shall be 3/4-inch maximum for slabs and sections 8 inches thick and less. Aggregate size shall be 1 inch maximum for all larger slabs and sections.

2. Combined aggregate grading shall be as shown in Table 03300-2.

Table 03300-2

	Maximum Aggregate Size	
	1 inch	**¾ inch**
Sieve Sizes	**Percent Passing**	
2 inch	---	---
1 ½ inch	100	---
1 inch	90 - 100	100
¾ inch	55 - 100	90 - 100
3/8 inch	45 - 75	60 - 80
No. 4	35 - 60	40 - 60
No. 8	27 - 45	30 - 45
No. 16	20 - 35	20 - 35
No. 30	12 - 25	13 - 23
No. 50	5 - 15	5 - 15
No. 100	1 - 5	0 - 5
No. 200	0 - 2	0 - 2

PART 3 - EXECUTION

3.01 INSPECTION

A. Examine the subgrade and the conditions under which work is to be performed and notify the Engineer in writing of unsatisfactory conditions. Do not proceed with the work until unsatisfactory conditions are corrected to comply with specified subgrade conditions in a manner acceptable to the Engineer.

3.02 MIXING AND TRANSPORTING CONCRETE

A. General: Conform to concreting procedures set forth in ASTM C94, ACI 304R and as specified herein.

1. Transport concrete to discharge locations without altering the specified properties of water-cement ratio, slump, air entrainment, temperature, and homogeneity.

2. Discharge concrete into forms within 1 ½ hours after cement has entered mixing drum or before the drum has revolved 300 revolutions after the addition of water, whichever occurs first.

3. Do not add water at the jobsite unless permitted by the Engineer. If it is necessary to add water to obtain the specified slump, add water per ASTM C 94, but do not exceed the maximum water content in the reviewed concrete design mix. Added water shall be incorporated by additional mixing of at least 35 revolutions.

4. Do not add water to concrete containing high range water reducing admixture. Do not add water to concrete in delivery equipment not acceptable for mixing.

5. Keep a record showing time and place of each pour of concrete, together with transit-mix delivery slips certifying the contents of the pour.

6. Discharge of concrete shall be completed within the limits set out in Table 03300-3.

Table 03300-3

Maximum Time to Concrete Discharge	
Concrete Temperature	**Limit**
Over 90°F	Remove concrete from jobsite and discard concrete
86 to 90°F	45 minutes
81 to 85°F	60 minutes
70 to 80°F	75 minutes
Below 70°F	90 minutes

B. Conveying: Convey concrete from agitator or mixer truck to place of final deposit in forms by one of the following methods:

1. Buckets or hoppers with discharge gates having a clear opening equal to not less than one-third the maximum interior horizontal area or five times the maximum aggregate size being used, whichever is greater, and side slopes of not less than 60 degrees to horizontal.

2. Buggies or wheelbarrows equipped with pneumatic tires.

3. Round bottom, metal or metal-lined chutes with inclined slope of between 2 to 3 feet horizontally to 1 foot vertically and of sufficient capacity to avoid overflow.

4. Circular drop pipes with a top diameter of at least eight times the maximum aggregate size, but not less than 6 inch, or tapered to not less than six times maximum aggregate size.

3.03 CONCRETE ACCEPTANCE

A. Accept or reject each batch of concrete delivered to the point of agitator or mixer truck discharge. Sign delivery batch tickets to indicate concrete acceptance.

B. Reject concrete delivered without a complete concrete delivery batch ticket as specified herein. The concrete supplier will furnish copies of the signed batch ticket to the Contractor and Engineer.

C. The testing agency shall perform field tests at the point of agitator or mixer truck discharge. Accept or reject concrete on the basis of conformity with slump, air content, and temperature specified.

D. The testing agency shall inspect concrete transit truck's barrel revolution counter and gauge for measuring water added to the concrete. Reject concrete that exceeds the maximum barrel revolution of 300, the limits in Table 03300-3, or concrete that has water content exceeding the specified water-cement ratio.

E. Reject concrete not conforming to specification before discharging into the forms.

3.04 PREPARATION AND COORDINATION

A. Contractor shall notify the Engineer of readiness to place concrete in any portion of the work a minimum of 5 working days prior to concrete placement. Failure to provide this notification will be cause for delay in placing until observations can be completed.

B. Reinforcement, positioning of embedded items, and condition of formwork will be observed by the Engineer prior to concrete placement.

C. Coordinate the sequence of placement such that construction joints will occur only as designed.

D. Schedule sufficient equipment for continuous concrete placing. Provide for backup equipment and procedures to be taken in case of an interruption in placing. Provide backup concrete vibrators at the project site. Test concrete vibrators the day before placing concrete.

E. Compact the subgrade and/or bedding. Saturate the subgrade approximately eight hours before placement. Remove standing water, mud, and foreign matter before concrete is deposited.

F. Where shown on contract drawings, intentionally roughen surfaces of set concrete in a manner to expose bonded aggregate uniformly at joints.

G. When shown on contract drawings, install a granular base beneath slabs on ground. Place granular material on a compacted subgrade and compact granular base.

H. Where concrete is required to be placed and bonded to existing concrete, coat the contact surfaces with epoxy bonding agent. The method of preparation and application of the bonding agent shall conform to the manufacturer's recommendations.

I. Clean concrete surfaces to receive grout free of ice, frost, dirt, grease, oil, curing compounds, laitance and paints, and free of all loose or unsound material or foreign matter that may affect the bond or performance of the grout.

J. Roughen concrete surfaces by chipping, sandblasting, or other mechanical means to ensure bond of the grout to the concrete. Remove loose or broken concrete. Irregular voids or projecting coarse aggregate need not be removed if they are sound, free of laitance and firmly embedded into the parent concrete.

K. Construct grout forms or other leak proof containment. Forms shall be lined or coated with release agents recommended by the grout manufacturer.

3.05 CONCRETE PLACEMENT

A. Placement shall conform to ACI 304R as modified by these specifications.

B. Alternate sections of concrete walls and slabs may be cast simultaneously. Do not place adjacent sections of walls and slabs until seven days after placement of first placed concrete.

C. Do not place concrete until free water has been removed or has been diverted by pipes or other means and carried out of the forms, clear of the work. Do not deposit concrete underwater, and do not allow free water to rise on any concrete until the concrete has attained its initial set. Do not permit free or storm water to flow over surfaces of concrete so as to injure the quality or surface finish.

D. Do not place concrete during inclement weather. Protect concrete placed from inclement weather. Keep sufficient protective covering ready at all times for this purpose.

E. Deposit concrete at or near its final position to avoid segregation caused by rehandling or flowing. Do not deposit concrete in large quantities in one place to be worked along the forms with a vibrator.

F. Deposit concrete continuously and in level layers 1 to 2 feet thick.

G. Do not deposit partially hardened concrete in forms. Retempering of partially hardened concrete is not permitted. Remove partially hardened concrete from site at no additional compensation.

H. Do not allow concrete to fall freely in forms to cause segregation (separation of coarse aggregate from mortar). Limit maximum free fall of concrete to 4 feet. Do not move concrete horizontally more than four feet from point of discharge. Space points of deposit not more than eight feet apart.

I. Consolidate concrete using mechanical vibrators operated within the mass of concrete and/or on the forms conforming to procedures set forth in ACI 309R and as specified herein.

J. Conduct vibration to produce concrete of uniform texture and appearance, free of honeycombing, streaking, cold joints, or visible lift lines.

K. Conduct vibration in a systematic manner with regularly maintained vibrators. Furnish sufficient backup units at job site. Use vibrators having minimum frequency of 8,000 vibrations per minute and of sufficient amplitude to consolidate concrete. Use not less than one vibrator with crew for each 35 to 40 cubic yards of concrete placed per hour.

L. Insert and withdraw vibrator vertically at a uniform spacing over the entire area of placement. Space distances between insertions such that spheres of influence of each insertion overlap.

M. Use additional vibration with pencil vibrators on vertical surfaces and on exposed concrete to bring full surface of mortar against the forms so as to eliminate air voids, bug holes, and other surface defects. Employ the following additional procedures for vibrating concrete as necessary to maintain proper consolidation of concrete:

1. Reduce distance between internal vibration insertions and increase time for each insertion.

2. Insert vibrator as close to face of form as possible without contacting form or reinforcement.

3. Use spading as a supplement to vibration where particularly difficult conditions exist.

N. Pumping Concrete

1. Conform to the recommendations of ACI 304.2R except as modified herein.

2. Base pump size on rate of concrete placement, length of delivery pipe or hose, aggregate size, mix proportions, vertical lift, and slump of concrete.

3. Use pipe with inside diameter of at least three times the maximum coarse aggregate size, but not less than 2 inches.

4. Do not use aluminum pipes for delivery of concrete to the forms.

3.06 CURING AND PROTECTION

A. General

1. Protect concrete from premature drying, hot or cold temperatures, and mechanical injury, beginning immediately after placement and maintain concrete with minimal moisture loss at relatively constant temperature.

2. Comply with curing procedures set forth in ACI 301, ACI 308, and as specified herein.

3. Perform hot weather concreting in conformance with ACI 305R and as specified herein when the ambient atmospheric temperature is 80 degrees F (27 degrees C) or above.

4. Perform cold weather concreting in conformance with ACI 306R.

5. Concrete required to be moist cured shall remain moist for the entire duration of the cure. Repeated wetting and drying cycles of the curing process will not be allowed.

B. Curing Duration

1. Start initial curing after placing and finishing concrete as soon as free moisture has disappeared from unformed concrete surfaces. Initial curing starts as soon as

concrete achieves final set. Forms left tightly in place are considered as part of the curing system, provided that wooden forms are kept continuously moist. Keep continuously moist for not less than 72 hours.

2. Begin final curing procedures immediately following initial curing and before the concrete has dried. Continue final curing for at least 7 days and in accordance with ACI 301 procedures for a total curing period, initial plus final, of at least 10 days.

3. Avoid rapid drying at the end of the final curing period.

C. Curing Requirements

1. Unformed Surfaces: Cover and cure entire surface of newly placed concrete immediately after completing finishing operations and water film has evaporated from surface or as soon as marring of concrete will not occur. Protect finished slabs from direct rays of the sun to prevent checking, crazing, and plastic shrinkage.

2. Formed Surfaces: Minimize moisture loss for formed surfaces exposed to heating by the sun by keeping forms wet until safely removed. Keep surface continuously wet by warm water spray or warm water saturated fabric immediately following form removal unless otherwise permitted by the Engineer.

3. Below Grade Structures: Moist cure by the application of water to maintain the surface in a continually wet condition unless otherwise permitted by the Engineer. Use water that is free of impurities that could etch or discolor exposed concrete surfaces.

4. Other concrete: Moist cure by moisture-retaining cover curing, or by the use of curing compound.

D. Curing Methods

1. Water Curing: Use water curing for unformed surfaces. Continuously water cure all exposed concrete for the entire curing period. Provide moisture curing by any of the following methods:

   a. Keeping the surface of the concrete continuously wet by ponding or immersion.

   b. Continuous water-fog spray or sprinkling.

   c. Covering the concrete surface with curing mats, thoroughly saturating the mats with water, and keeping the mats continuously wet with sprinklers or porous hoses. Place curing mats so as to provide coverage of the concrete surfaces and edges, with a 4 inch lap over adjacent mats. Weight down the curing cover to maintain contact with the concrete surface.

2. Sealing Materials

    a. Use common sealing materials such as plastic film or waterproofing (kraft) paper.

    b. Lap adjacent sheets a minimum of 12 inch. Seal edges with waterproof tape or adhesive. Use sheets of sufficient length to cover sides of concrete member.

    c. Place sheet materials only on moist concrete surfaces. Wet concrete surface with fine water spray if the surface appears dry before placing sheet material.

    d. The presence of moisture on concrete surfaces at all times during the prescribed curing period is proof of acceptable curing using sheet material.

3. Membrane Curing Compound

    a. Apply membrane-curing compound uniformly over concrete surface by means of roller or spray at a rate recommended by the curing compound manufacturer, but not less than 1 gallon per 150 sq. ft. of surface area. Agitate curing material in supply container immediately before transfer to distributor and thoroughly agitate it during application for uniform consistency and dispersion of pigment.

    b. Do not use curing compounds on construction and expansion joints.

    c. Reapply membrane-curing compound to concrete surfaces that have been subjected to wetting within 3 hours after curing compound has been applied by method for initial application.

E. Protection from environmental conditions: Maintain the concrete temperature above 50 degrees F (10 degrees C) continuously throughout the curing period. Make arrangements before concrete placing for heating, covering, insulation, or housing to maintain the specified temperature and moisture conditions continuously for the curing period.

1. When the atmospheric temperature is 80 degrees F (25 degrees C) and above, or during other climatic conditions which will cause too rapid drying of the concrete, make arrangements before the start of concrete placing for the installation of wind breaks or shading, and for fog spraying, wet sprinkling, or moisture-retaining covering.

2. Protect the concrete continuously for the entire curing period.

3. Maintain concrete temperature as uniformly as possible, and protect from rapid atmospheric temperature changes.

4. Avoid temperature changes in concrete that exceed 5 degrees F (3 degrees C) in any one hour and 50 degrees F (10 degrees C) in any 24-hour period.

F. Protection from physical injury: Protect concrete from physical disturbances such as shock and vibration during curing period. Protect finished concrete surfaces from damage by construction equipment, materials, curing procedures, and rain or running water. Do not load concrete in such a manner as to overstress concrete.

G. Protection from Deicing Agents: Do not apply deicing chemicals to concrete.

3.07 CONCRETE FINISHING

A. Unless otherwise indicated, provide the following slab finishes for concrete pad and Geocell infill: Float and broom finish.

B. Concrete shall be within ¼ inch of a 10 foot straightedge in all directions except where slabs are dished for drains. Deviations from the elevation indicated shall not exceed ¼ inch.

C. Slabs sloped for drainage shall not have depressions that retain water.

D. Immediately after placement, screed concrete with straightedges or power strikeoffs. Do not use roller screeds or vibrating screeds.

E. Stakes shall not be used during placement of geocell concrete infill to avoid damage to underlying geomembrane.

F. Immediately after screeding, darby surface with wood or magnesium darby to eliminate ridges and to fill in voids left by screeding.

3.08 FLOAT FINISH

A. Float concrete using hand floats or power driven floats after the concrete has stiffened to a point where only a ¼ inch indentation can be imparted by normal foot pressure.

B. Float finish shall result in a uniform, smooth, granular texture. After floating, check slab tolerances with 10-foot straightedge. Cut down high spots, and fill low spots with fresh concrete; do not sprinkle with dry cement.

3.09 BROOMING

A. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route, or direction of water flow.

3.10 INSTALLATION OF GROUT

A. Mix in accordance with the manufacturer's recommendations. Do not add cement, sand, pea gravel, or admixtures without prior approval by the grout manufacturer and the Engineer.

B. Avoid mixing by hand. Pre-wet the mixer and empty excess water. Add premeasured amount of water for mixing, followed by the grout Begin with the minimum amount of water recommended by the manufacturer and then add the additional water required to obtain workability. However, do not exceed the manufacturer's maximum recommended water content.

C. Place grout into the designated areas in a manner that will avoid segregation or entrapment of air. Do not vibrate grout to release air or to consolidate the material. Placement should proceed in a manner that will ensure the filling of all spaces and provide full contact between the grout and adjoining surfaces. Provide grout holes as necessary. Place grout rapidly and continuously to avoid cold joints. Do not place cement grouts in layers. Do not add additional water to the mix (re-temper) after initial stiffening.

D. Begin curing immediately after form removal, cutback, and finishing. Keep grout moist and within its recommended placement temperature range for at least 24 hours after placement or longer if recommended by the manufacturer.

3.11 FIELD QUALITY CONTROL

A. Hot Weather Requirements

1. During hot weather, give proper attention to ingredients, production methods, handling, placing, protection, and curing to prevent excessive concrete temperatures or water evaporation in accordance with ACI 305R.

2. When the weather is such that the temperature of the concrete as placed would exceed 90 degrees F (32.2 degrees C), use ice, or other means of cooling the concrete during mixing and transportation so that the temperature of the concrete as placed will not exceed 90 degrees F (32.2 degrees C).

3. Take precautions when placing concrete during hot, dry weather to eliminate early setting of concrete. This includes protection of reinforcing from direct sunlight to prevent heating of reinforcing, placing concrete during cooler hours of the day, and the proper and timely application of specified curing methods.

4. There will be no additional reimbursement to the Contractor for costs incurred for placing concrete in hot weather.

B. Cold Weather Requirements

1. Provide adequate equipment for heating concrete materials and protecting concrete during freezing or near-freezing weather in accordance with ACI 306R.

2. When the temperature of the surrounding atmosphere is 40 degrees F (4.4 degrees C) or is likely to fall below this temperature, use heated mixing water not to exceed 140 degrees F (60 degrees C). Do not allow the heated water to come in contact with the cement before the cement is added to the batch.

3. When placed in the forms during cold weather, maintain concrete temperature at not less than 55 degrees F (12.8 degrees C). Materials shall be free from ice, snow, and frozen lumps before entering the mixer.

4. Maintain the air and the forms in contact with the concrete at temperatures above 40 degrees F (4.4 degrees C) for the first five days after placing, and above 35 degrees F (1.7 degrees C) for the remainder of the curing period. Provide thermometers to indicate the ambient temperature and the temperature 2 inches inside the concrete surface.

5. There will be no additional reimbursement made to the Contractor for costs incurred for placing concrete during cold weather.

C. Concrete Testing

1. Engage an independent testing agency to perform concrete quality testing and inspection.

2. The testing agency shall use concrete samples provided by the Contractor at the point of agitator or mixer truck discharge to perform slump (per ASTM C143) , air content (per ASTM C231), and temperature tests (per ASTM C1064) and for field control test specimens.

3. The testing agency shall submit test reports of concrete field measurements specified above to the Contractor and to the Engineer.

4. Provide and maintain facilities for safe storage and proper curing of concrete test specimens on the project site, as required by ASTM C31.

5. Concrete Quality Test Specimen

    a. Perform sampling and curing of test specimen in accordance with ASTM C31.

    b. Testing agency personnel shall record truck and load number from the delivery batch ticket, the concrete placement location of each specimen, the date, concrete strength, slump, air content, and temperature.

    c. The testing agency shall cast a minimum of one set of 4 test specimens (4 inch diameter by 8 inch long cylinders) for each 50 cubic yards of each mix design of concrete but not less than once a day nor less than once for each 5,000 sq. ft. of surface area of footings, slabs on grade, or walls.

    d. Test cylinders in accordance with ASTM C39. Test one cylinder at 7 days for information; test 2 cylinders at 28 days for acceptance; and hold one reserve cylinder for 56 days to be tested only at the direction of the Engineer. Strength acceptance will be based on the average of the strengths of the 2 cylinders tested at 28 days. If one cylinder of a 28-day test manifests evidence of improper sampling, molding, or testing, other than low strength, discard it and use a reserve cylinder for the test result.

6. The Contractor may take field control test specimens for small quantities of concrete.

7. Concrete acceptance shall be based on the requirements of ACI 318.

8. Field cured cylinders conforming to ASTM C31 will be required to determine field compressive strength of concrete. Laboratory cured cylinders for concrete quality testing shall not be used for determining field compressive strength.

9. Concrete Coring

    a. When the concrete quality test specimen compression tests fail to be in compliance with the Contract Documents or when the Engineer detects deficiencies in the concrete, the Contractor will take concrete cores at least 2 inches in diameter from the structure in conformance with ASTM C 42 at locations determined by the Engineer.

        i. Where applicable, Contractor shall be responsible for repairing damage to underlying geosynthetics caused by concrete coring.

    b. Obtain at least three representative cores from each member or area of concrete that is considered potentially deficient.

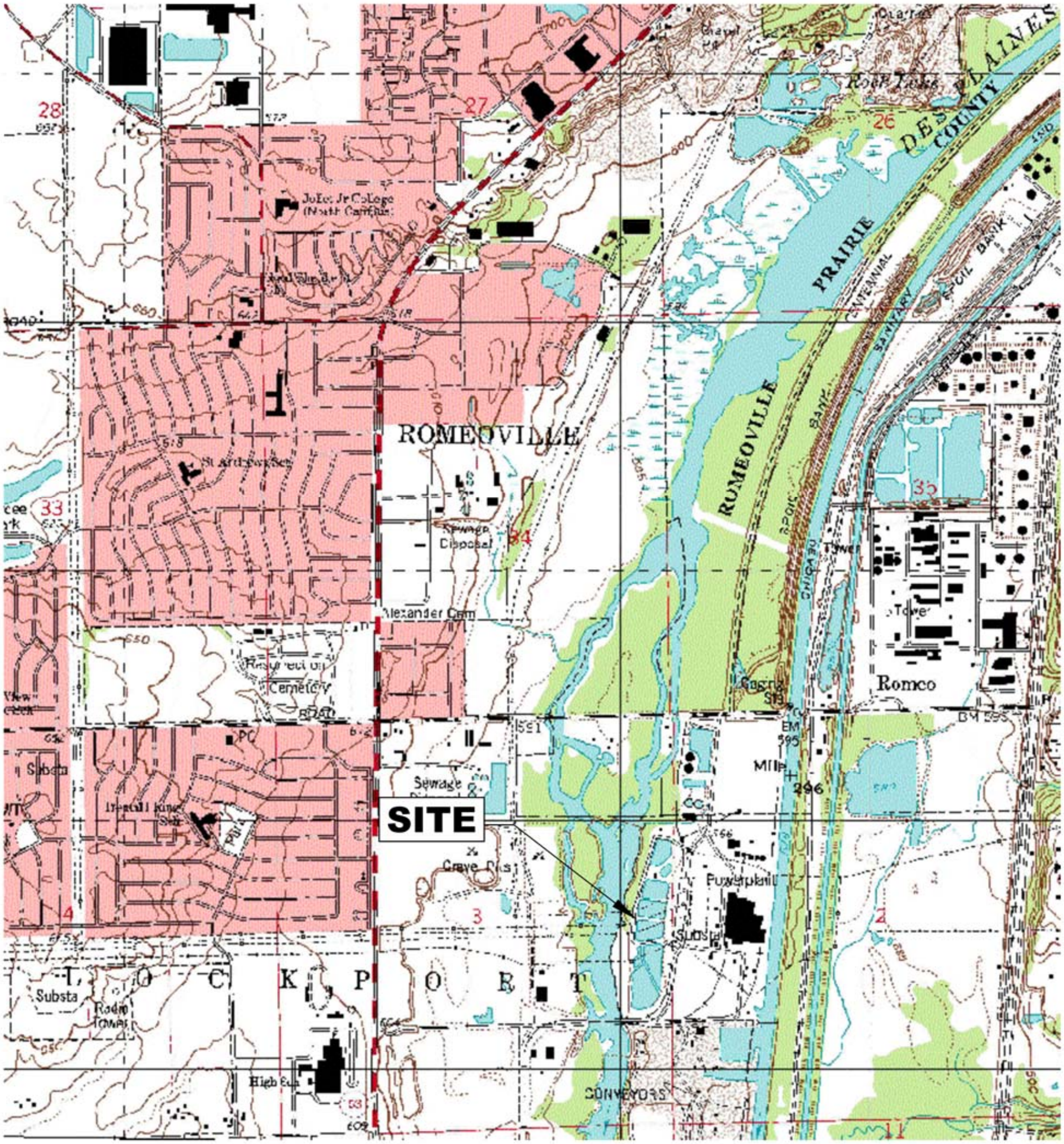
    c. Obtain additional cores to replace cores that show evidence of having been damaged subsequent to or during removal from the structure.

    d. The testing agency shall compression test the cores taken from the structure in conformance with ASTM C39 and submit test strength test results of cores specified above to the Contractor and to the Engineer.

    e. All costs associated with coring and testing of cores will be borne by the Contractor at no additional cost to the Owner.

END OF SECTION

FIGURES



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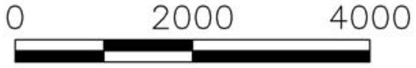


SCALE IN FEET

CONTOUR INTERVAL 10 FEET

NATURAL
RESOURCE
TECHNOLOGY

SITE LOCATION MAP

MIDWEST GENERATION
WILL COUNTY POWER PLANT
ROMEOVILLE, ILLINOIS

DRAWN BY: RLH 01/09/08 APP'D BY: HMS DATE: 01/25/08

PROJECT NO.
1900

DRAWING NO.
1900–A01

FIGURE NO.
1

TABLES

Table 1. List of Documentation Surveys
South Ash Pond 2 Liner Replacement Specifications
Midwest Generation – Will County Generating Station

Survey	Responsible Party	Frequency	Technical Specification Reference
Topographic survey of prepared subgrade prior to placement of geomembrane	Contractor	Min. 50 ft square grid and at grade changes	Section 01050, 1.02A
Location and dimensions of anchor trench	Contractor	Every 25 ft intervals	Section 01050, 1.02B
Location and elevation geomembrane panels, seams, and repairs	Contractor	At panel corners, termination in anchor trench, and repairs, as necessary to develop an as-built drawing	Section 01050, 1.02C Section 02600, 1.05D, 3.09A
Location of guardrails	Contractor	As necessary	Section 01050, 1.02D
Topographic survey of geocell layer	Contractor	Min. 50 ft square grid and at grade changes, at same locations surveyed prior to placement of geomembrane	Section 01050, 1.02E
Topographic survey of warning layer	Contractor	Min. 50 ft square grid and at grade changes, at same locations surveyed prior to placement of geomembrane	Section 01050, 1.02E

Notes

1. Contractor shall provide Owner and/or Engineer results of survey within 2 working days after completion.
2. Owner and/or Engineer acceptance or rejection will be provided within 2 working days following receipt of documentation survey.

Table 2 - List of Submittals
South Ash Pond 2 Liner Replacement Specifications
Midwest Generation – Will County Generating Station

	Submittal (1)	From	To	Time Frame	Technical Specification	
					Section	Part
1	Subcontractor List	Contractor	Owner and/or Engineer	**With bid documents**		
2	Baseline Construction Schedule	Contractor	Owner and/or Engineer	**With bid documents** and update within 10 calendar days of the date of the Contract award		
3	Geocell Installer Qualifications	Contractor	Owner and/or Engineer	**With bid documents**	02078	1.03C
4	Name and Location of Recycling / Disposal Facility	Contractor	Owner and/or Engineer	**With bid documents**	02300	1.06B
5	Supplier and Location of all Material Sources	Contractor	Owner and/or Engineer	**With bid documents**	02300	1.06C
7	Leak Location Contractor's Work Plan	Contractor	Owner and/or Engineer	**With bid documents**	02600	1.05.C
8	IEPA Water Pollution Control Construction Permit	Owner through Engineer	Contractor	Prior to project start		
9	General Permit for Storm Water Discharges from Construction Site Activities	Owner through Engineer	Contractor	Prior to project start		
10	Site Superintendent/Foreman's Name & Phone Number	Contractor	Owner and/or Engineer	Prior to project start		
11	Borrow Material Documentation Certificates and Test Results	Contractor	Owner and/or Engineer	Prior to project start	02300	1.06E
12	Geosynthetics Raw Materials Information	Installer	Owner and/or Engineer	Prior to project start	02600	1.05A.1
13	Geosynthetics Manufacturer's Certification - Production Information includes QC Plan	Installer	Owner and/or Engineer	Prior to project start	02600	1.05A.2 & 1.05A.3
14	Geotextile Manufacture's Certification	Installer	Owner and/or Engineer	Prior to project start	02600	1.05A.4
15	Geomembrane Installer's Personnel and Information	Contractor	Owner and/or Engineer	Prior to project start	02600	1.05B.1 & B.2

Table 2 - List of Submittals
South Ash Pond 2 Liner Replacement Specifications
Midwest Generation – Will County Generating Station

	Submittal (1)	From	To	Time Frame	Technical Specification	
					Section	**Part**
16	Geomembrane Panel Layout Drawing	Contractor	Owner and/or Engineer	Prior to project start	02600	1.05B.3
17	Construction Progress Schedule	Contractor	Owner and/or Engineer	Prior to project start	02600	1.05B.4
18	Description of seaming apparatus to be used indicating compliance with specified requirements	Contractor	Owner and/or Engineer	Prior to project start	02600	1.05B.5
19	Construction Start Date	Contractor	Owner and/or Engineer	At least 5 Working days prior to construction start	02300	1.06D
20	Geocell Warranty	Contractor	Owner and/or Engineer	Two weeks prior to delivery	02078	1.06
21	Reconstructed Bank Material Represenative Sample	Contractor	Owner and/or Engineer	Two weeks prior to delivery	02300	2.02
21	Cushion Material Representative Sample	Contractor	Owner and/or Engineer	Two weeks prior to delivery	02300	2.03
22	Warning Layer Representative Sample	Contractor	Owner and/or Engineer	Two weeks prior to delivery	02300	2.04
23	Concrete Accessories and Admixtures Manufacturere's Certificate and Literature	Contractor	Owner and/or Engineer	Two weeks prior to delivery	03300	1.03A
24	Cement & Aggregate Certifications	Contractor	Owner and/or Engineer	Two weeks prior to delivery	03300	1.03B.1 & B.2
25	Certificate of Compliance with Concrete Admixtures	Contractor	Owner and/or Engineer	Two weeks prior to delivery	03300	1.03B.3
26	Concrete Mix Design	Contractor	Owner and/or Engineer	Two weeks prior to delivery	03300	1.03B.4
27	Procedures for Protection of Concrete during Wet, Cold, and Hot Weather	Contractor	Owner and/or Engineer	Two weeks prior to delivery	03300	1.03B.5 & B.6
28	Concrete Independent Testing Agency Certification	Contractor	Owner and/or Engineer	Two weeks prior to delivery	03300	1.03B.7
29	Expoxy Bonding Compound Manufacturer's Instruction & Data	Contractor	Owner and/or Engineer	Two weeks prior to delivery	03300	1.03C

Table 2 - List of Submittals
South Ash Pond 2 Liner Replacement Specifications
Midwest Generation – Will County Generating Station

					Technical Specification	
	Submittal (1)	From	To	Time Frame	Section	Part
30	Geocell Manufacturer's Shop Drawings	Contractor	Owner and/or Engineer	5 working days prior to material delivery to site	02078	1.03A
31	Geocell Manufacturer's Certification	Contractor	Owner and/or Engineer	5 working days prior to material delivery to site	02078	1.03B & 1.04B
32	Accident Reports, Work Stoppage/Dispute Records, Contractor Invoices, Schedule of Values, Test Report Records, and Equipment Check Records	Contractor	Owner and/or Engineer	As Necessary		
33	Geotechnical Field Test Results	Contractor and/or Field Technician	Engineer	Within 24 hours of test completion	02300	1.06F
34	Concrete Quality Control/Assurance - delivery tickets, cement weight, aggregate size, water added, test results etc.	Contractor	Engineer	Within 24 hours of test completion	03300	1.03D 3.11B
35	Geomembrane Installer's Daily Logs and Quality Control Documentation	Contractor	Owner and/or Engineer	During geomembrane installation, on a weekly basis	02600	1.05D.1
36	Geomembrane Installer's Subgrade Acceptance	Contractor	Owner and/or Engineer	Each day prior to geomembrane installation	02600	1.05D.2 3.02
37	Survey Data (See Table 1)	Contractor	Owner and/or Engineer	Within 4 days following completion of survey	01050	1.05
38	Contractor Notice to Proceed with Placement of Cushion and Warning Layer	Owner and/or Engineer	Contractor	Upon verification of completion of geosynthetics installation	02300	3.08A
39	Conditional and/or Final Geomembrane Installation Acceptance	Owner and/or Engineer	Contractor	Upon completion of geomembrane installation and submittals	02600	1.05F & G
40	Geomembrane Installation Certificate, As-Builts, and Warranties	Contractor	Owner and/or Engineer	Within 10 working days of geomembrane installation completion	02600	1.05E

Table 2 - List of Submittals
South Ash Pond 2 Liner Replacement Specifications
Midwest Generation – Will County Generating Station

	Submittal (1)	From	To	Time Frame	Technical Specification	
					Section	Part
41	Final Leak Location Survey Report	Contractor	Owner and/or Engineer	Within 14 days following completion of leak location survey	02600	1.05H
42	Notice of Final Completion and Written Certification for Project	Contractor	Owner and/or Engineer	Upon completion of work	01700	1.03B & C
43	Record Documents	Contractor	Owner and/or Engineer	Prior to submittal of final invoice	01700	1.04

(1) The list of sunbmittals is not all-inclusive. Referer to the Contract Documents to determine necessary submittals.

TABLE 3
SUMMARY OF CQA MATERIAL TESTS
Midwest Generation-Will County South Pond 2 Liner Replacement

Laboratory Testing

Material	Test Designation	Test Standard	Frequency	Acceptance Criteria	Coordinating Responsible Party	Submittal Criteria	Responsible Party to Perform Tests
Imported Reconstructed Bank Material	Grain Size	ASTM D422	One sample before bank construction	Section 02300, Part 2.02	Contractor	Results 2 weeks prior to the start of bank construction	Geotechnical Laboratory
	USCS Classification & organic content	ASTM D2487	One sample before bank construction	N/A	Contractor	Results 2 weeks prior to the start of bank construction	Geotechnical Laboratory
	Moisture Content	ASTM D2216	One sample before bank construction	N/A	Contractor	Results 2 weeks prior to the start of bank construction	Geotechnical Laboratory
	Modified Proctor	ASTM D1557	One sample before bank construction	N/A	Contractor	Results 2 weeks prior to the start of bank construction	Geotechnical Laboratory
Cushion Layer & Warning Layer Material	Grain Size	ASTM D422	One sample two weeks prior to delivery to site	Section 02300, Part 2.03, & 2.04	Contractor	Results 2 weeks prior to delivery to the site	Geotechnical Laboratory
	USCS Classification & organic content	ASTM D2487	One sample two weeks prior to delivery to site	Section 02300, Part 2.03, & 2.04	Contractor	Results 2 weeks prior to delivery to the site	Geotechnical Laboratory

Field Testing

Material	Test Designation	Test Standard	Frequency	Acceptance Criteria	Coordinating Responsible Party	Submittal Criteria	CQA Laboratory Performing Tests
Reconstructed Bank Material	In place Density and Moisture Content	ASTM D6938	Every 6-inch lift on a 25-foot grid offset for each lift (minimum of 5 test per lift)	90% of maximum dry density	Contractor	Within 24-hours of test completion	Geotechnical Field Technician

APPENDIX A

STORM WATER POLLUTION PREVENTATIVE PLAN

STORM WATER POLLUTION PREVENTION PLAN
April 24, 2013

PROJECT: Midwest Generation Will County Generating Station
Romeoville, Illinois
South Ash Ponds 2 Liner Replacement

Project Description and Proposed Construction Activities

South Ash Ponds 2 is a settling pond for bottom ash sluiced from coal combustion boilers associated with electrical power generation. The operating volume of South Ash Pond 2 is approximately 3.7 million gallons at 1.0 foot of freeboard. The effluent from each pond is either recycled into the electric generating process or treated before discharge to the Chicago Sanitary and Ship Canal, as authorized under the station's NPDES Permit No. IL0002208.

Liner replacement activities will include:

- Subgrade preparation for the new HDPE geomembrane liner, including partial removal of the existing Poz-o-Pac liner to accommodate a warning layer above the replacement liner, as described below;
- Poz-o-Pac and associated fill soils removed from the existing liner will be either stockpiled for reuse or recycled/disposed;
- Deployment and seaming of the new liner; and
- Placement of cushion and warning layers over the new liner.

Land disturbance will occur at the base of the pond and temporary stockpile area, as shown on Figure 1. Approximately 2 acres of total area is estimated to be disturbed by excavation, grading, and/or other activities during construction (0.5 acres in stockpile area and 1.3 acres at the base of Pond 2). Details regarding the site, including truck entrance/exit, drainage patterns, area of disturbance, stockpile area, and erosion control measures are shown on the enclosed Figure 1.

Erosion and Sediment Controls

The following erosion and sediment controls will be utilized:

- Placement of a gravel berm or silt fence around stockpiled materials (Figure 1);
- Inactive stockpiles (i.e., material not added to or removed from stockpiles for 7 days) will be covered and anchored with temporary plastic to prevent erosion;
- No land will be disturbed outside the pond footprint, except the stockpile area, that will cause a change in storm water flow;
- Storm water runoff that enters the pond (disturbed area) will be pumped and discharged to an active operating pond for treatment prior to plant reuse or discharge to the Chicago Sanitary and Ship Canal;
- Storm water runoff that enters the South Run-off Basin is treated prior to plant reuse or discharge to the Chicago Sanitary and Ship Canal; and
- Active control of dust, mud, water, and erosion along haul route and of stockpile will be

conducted at the site, as specified in technical specification Section 01500 – Construction Facilities and Temporary Controls (Appendix A).

Maintenance

During construction, the Contractor will:

- Maintain a clean working area and avoid grade changes outside the ponds to circumvent changes in runoff direction and concentration;
- Maintain or replace erosion and sediment control measures, as necessary;
- Maintain/clean access road, as necessary;
- Maintain dewatering equipment to prevent leaks and spills outside the vicinity of the ponds; and
- At project completion, erosion and sediment control measures will be removed and the stockpile areas will be restored to pre-construction conditions.

Inspections

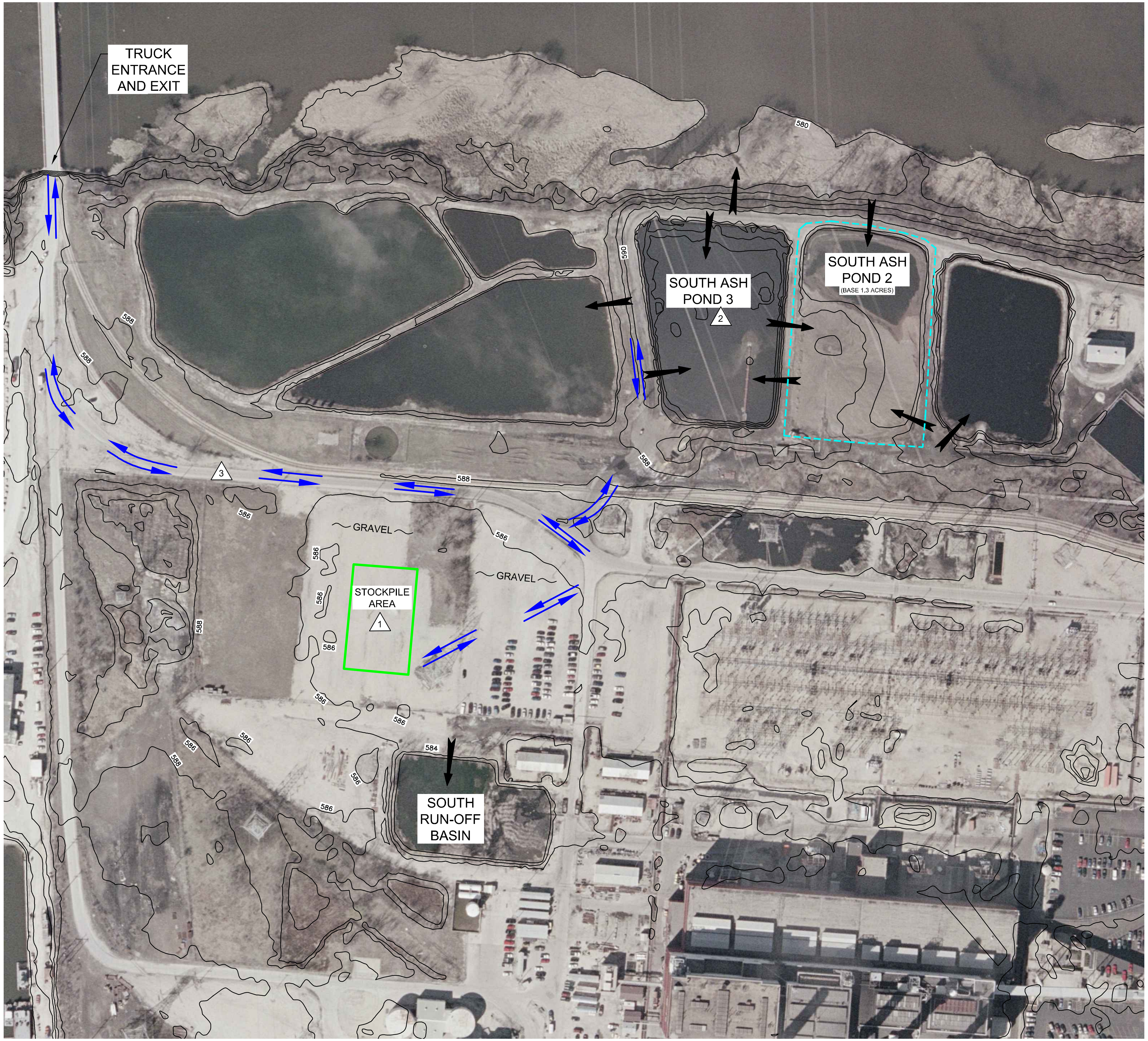
Qualified personnel, as defined under the General Permit for Storm Water Discharges, will inspect erosion and sediment controls and locations where vehicles enter or exit the site. Such inspections will be conducted at least once every seven calendar days and within 24 hours of the end of a storm that is 0.5 inch of rain or greater. Disturbed areas and areas used for storage of materials that are exposed to storm water will be inspected for evidence of, or the potential for, pollutants entering the drainage system. Erosion and sediment control measures identified in the plan will be inspected to verify that they are operating correctly. Areas where construction traffic enters or exits the site will be inspected for evidence of off-site sediment tracking.

Based on results of the inspection, the erosion and sediment control measures identified under "Controls" above will be maintained as necessary as soon as practicable after inspection. A summary of the inspection, including the following information, will be recorded on the inspection form (Appendix B):

- Name(s) and qualifications of personnel making the inspection;
- Date(s) of inspection;
- Major observations relating to the implementation of the SWPPP; and
- Actions taken.

Enclosure: Figure 1 – Site Map
Appendix A – Specification Section 01500, Construction Facilities
Appendix B – Inspection Form

FIGURES



⌒	2007 GROUND SURFACE CONTOURS
- - -	LIMIT OF DISTURBED AREA
⇄	TRUCK ROUTE
🟩	SILT FENCE OR GRAVEL BERM
➤	SURFACE WATER FLOW DIRECTION
586	ELEVATION (FEET)

NOTES: △

1. INACTIVE STOCKPILES (ie., MATERIAL NOT ADDED TO OR REMOVED FROM STOCKPILE FOR 7 DAYS) SHALL BE COVERED AND ANCHORED WITH TEMPORARY PLASTIC TO PREVENT EROSION.

2. MANAGE AND DISCHARGE STORMWATER TO ACTIVE (OPERATING) SOUTH ASH POND 3 FOR TREATMENT.

3. CONTROL TRACKING OF MUD FROM TRUCK ROUTE.

N

0 100 200

SCALE IN FEET

SOURCE:

1. TOPOGRAPHIC SURVEY OF 2007 (CONTOUR INTERVAL 2 FEET) FROM WILL COUNTY GEOGRAPHIC INFORMATION SYSTEMS DEPARTMENT.

2. ILLINOIS NATURAL RESOURCES GEOSPATIAL DATA CLEARINGHOUSE. ILLINOIS STATE PLANE EAST ZONE NAD 83 DATUM CAPTURED SPRING 2005.

DRAWN BY: RLH DATE: 04/19/13
CHECKED BY: HMS DATE: 04/19/13
APPROVED BY: . DATE: .
DRAWING NO: 21131-32-B01C
REFERENCE:

DRAFT

SITE MAP

STORM WATER POLLUTION PREVENTION PLAN
ASH POND LINER REPLACEMENT
MIDWEST GENERATION
WILL COUNTY GENERATING STATION
ROMEOVILLE, ILLINOIS

NATURAL RESOURCE TECHNOLOGY

PROJECT NO.
2113.1/3.2

FIGURE NO.
1

APPENDIX A

SPECIFICATION SECTION 01500
CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

SECTION 01500
CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Use of Site Facilities

B. Security

C. Access Roads and Parking

D. Telephone Service

E. Temporary Utilities

F. Sanitary Facilities

G. Equipment Storage Locations

H. Dust and Mud Controls

I. Construction Noise

J. Water and Erosion Controls

K. Barriers and Protection of Installed Work.

L. Site Progress Cleaning

M. Fuel Storage and Handling

N. Protection of the Environment

O. Public Road Requirements

P. Additional Requirements

1.02 USE OF SITE FACILITIES

A. Use of Site

1. Contractor shall consult with the Owner and/or Engineer regarding locations for offices, trailers, material storage, access roads, fences, gates, and areas within construction limits for use by Contractor.

2. Contractor shall conduct construction activities in a manner to minimize interference with plant operations.

3. Confine equipment, storage of materials, and operations of workmen to areas designated by the Owner. Do not bring materials onto site until reasonably required for progress of work. No area outside of construction limit or staging area may be used for any purpose by Contractor or subcontractors unless expressly approved by the Owner in writing.

4. Store, place, and handle material and equipment to protect from any damage. Contractor shall move materials, sheds, or storage platforms, as necessary or when required for continuing construction at Contractor's expense.

5. Owner assumes no responsibility for project material or equipment stored on-site or off-site. Contractor assumes full responsibility for damage due to storage of materials.

6. Contractor is responsible to schedule work, storage of materials, etc., to minimize interference with construction activities.

7. Contractor is responsible for all snow removal as necessary during duration of project, as necessary.

8. Contractor is responsible for controlling sediment migration, preventing tracking of sediment onto site access roads and public roads, and cleaning site access roads and public right-of-ways and streets daily (or as deemed necessary by Owner) with commercial street sweepers.

B. Contractor shall inspect site with Owner and/or Engineer prior to start of work to determine existing conditions in conjunction with preconstruction meeting.

1.03 SECURITY

A. Security is not provided by Owner for Contractor's property.

B. Contractor is responsible for loss or injury to persons or property where his work is involved, and shall provide security and take precautionary measures as deemed necessary to protect Contractor's and Owner's interests.

1.04 ACCESS ROADS AND PARKING

A. Contractor shall maintain the service road accessing the construction areas and stockpile areas as necessary, or as directed by Owner and/or Engineer.

B. Contractor shall use the south plant entrance that crosses over station train tracks for truck access to deliver material. Note train traffic occurs frequently and has the right of way, which may cause trucks to wait and delay delivery.

C. Parking areas on-site shall be within the work area or area designated by Owner

1.05 TELEPHONE SERVICE

A. Contractor shall provide, maintain, and pay for cellular phone service for Contractor's designated on-site superintendent or foreman. In addition, subcontractor's designated on-site personnel shall have cellular phones.

1.06 TEMPORARY UTILITIES

A. Electricity

1. Contractor shall arrange with Owner for temporary electrical service as needed.

3. OSHA regulations require that employers shall use either ground fault circuit interrupters (GFCIs) or an assured equipment grounding conductor program (AEGCP) in addition to any other regulations for equipment grounding conductors.

4. Utilize and remove upon completion of project an electrical distribution system for temporary light and power during construction, if necessary.

B. Water

1. Contractor shall arrange with Owner for water service as needed. Contractor shall furnish and install all temporary connections required to complete Work and shall furnish his own shutoff valves and hose connections.

2. Contractor may use the water in the South Run-off Basin or shall provide clean water to be used for dust suppression in work areas. Dust suppression will be necessary for haul roads, stockpile areas, and within construction limits. Submit source of clean water to be used for dust suppression to Owner and/or Engineer for approval prior to project commencement.

3. Contractor shall provide potable water for Contractor's employees, as necessary.

1.07 SANITARY FACILITIES

A. Contractor shall provide sanitary facilities on-site conforming to state and local health and sanitation regulations in sufficient number for use of Contractor's employees.

B. Contractor shall maintain on-site facilities in sanitary condition at all times.

1.08 EQUIPMENT STORAGE LOCATIONS

A. Contractor shall park equipment and store materials only in areas proposed by Contractor and approved by Owner.

B. Restore disturbed areas to pre-construction condition upon project completion.

1.09 DUST AND MUD CONTROLS

A. Conduct operations and maintain site to minimize creation and dispersion of dust and mud.

B. Provide equipment necessary to control dust generation resulting from wind effects on open stockpiles, excavations, and from Contractor's vehicle and equipment traffic at all times. Control dust by application of water to affected areas, such that surfaces are moistened to prevent dust from becoming a nuisance to public, neighbors, and concurrent performance of other work at site. Contractor shall prevent dusting 24 hours a day from project commencement to substantial completion of the work.

D. Control mud and tracking of mud over site access roads and public roads along haul routes. Maintain surfaces in proper condition to facilitate removal efficiency.

E. The Owner and/or Engineer shall monitor site conditions related to dust and mud generation on a daily basis and direct Contractor to take actions as necessary to address deficient practices or conditions deleterious to construction and/or public.

F. Clean public right-of-ways and streets as deemed necessary by Owner with commercial street sweepers.

1.10 CONSTRUCTION NOISE

A. The Owner shall decide on the adequacy of provision and maintenance of noise reduction equipment. When so instructed by the Owner, the Contractor shall immediately withdraw any equipment from service and carry out all necessary additions, replacements, or repairs to the noise reduction equipment to the satisfaction of the Owner.

1.11 WATER AND EROSION CONTROLS

A. Contractor shall install and maintain erosion control measures necessary to prevent runoff, tracking, or loss of soil materials by water or mechanical action from disturbed portions of the site or excavation areas(s), as shown on the Contract Drawings and in accordance with the project’s Storm Water Pollution Prevention Plan (SWPPP), as presented in Appendix A.

B. No direct discharge shall be allowed into any of the ponds on-site without the approval from Owner.

1.12 BARRIERS AND PROTECTION OF INSTALLED WORK

A. Contractor shall protect installed work and provide special protection as needed.

B. Construction traffic shall be prohibited on completed and/or landscaped areas.

C. Protect existing facilities and adjacent properties from damage during construction operations.

1.13 SITE PROGRESS CLEANING

A. Maintain areas free of waste materials, debris, and rubbish. Site shall be maintained in clean and orderly condition.

B. Remove waste materials, debris, and rubbish from site weekly and dispose off-site at Contractor’s expense and in accordance with federal, state, and local regulations.

C. Contractor shall provide a dumpster on-site for general waste materials and rubbish during site activities.

1.14 FUEL STORAGE AND HANDLING

A. Store fuel according to local, state, and federal laws.

B. At no time shall overtopping fuel tanks or spillage to the ground surface be allowed.

1.16 PROTECTION OF THE ENVIRONMENT

A. Minimize air pollution by use of properly operating emission control devices on construction vehicles and equipment. Encourage shutdown of motorized equipment not in use.

B. Trash burning not permitted on-site.

C. All areas for handling and storage of fuels, oils, and other potentially hazardous liquids shall have spill containment or release prevention measures. Maintenance of equipment on-site shall be with prior approval of the Owner and/or Engineer.

D. All waste materials shall be recycled, hauled to a licensed solid waste landfill, or otherwise disposed of in an environmentally sound manner and in compliance with all applicable local, state, and federal rules.

E. All hazardous waste shall be stored, handled, and disposed of in compliance with applicable local, state, and federal rules.

F. Other measures shall be taken, as necessary, to maintain work site in an environmentally sound matter.

G. All spills or leaks of fuels, oil, or other IEPA-reportable liquids resulting from handling or equipment malfunctions shall be reported immediately to Owner and/or Engineer. Affected soils shall be properly removed from limits of construction and disposed in accordance with applicable local, state, and federal rules at the sole expense of the Contractor and as agreed by the Owner and/or Engineer. Copies of manifests, if necessary, shall be provided to Owner and/or Engineer within five working days of disposal. Waste Generator Manifests shall not state Owner as Generator. Owner reserves right to order leaking equipment removed from site.

1.17 PUBLIC ROAD REQUIREMENTS

A. Contractor shall comply with Local Weight Limits. Local roads shall be cleaned daily, as necessary, to maintain their condition free of mud and dirt.

B. The Contractor shall conduct his operations on the site in a manner that will minimize interference with the normal operation of plant, adjoining public and private roads and parking lots, and shall implement all specified and other appropriate measures to ensure the safety of all users of the adjoining public and private roads and parking lots.

C. Contractor shall provide flag person(s) as necessary and at request of Owner and/or Engineer.

1.18 ADDITIONAL REQUIREMENTS

A. No cameras are allowed on the site without permission from the Owner.

B. No firearms or explosives are allowed on-site.

C. Possession and/or use of intoxicating beverages and nonprescription drugs are prohibited at all times. Persons caught in possession or under the influence of drugs or alcohol will be immediately dismissed and removed from the site.

D. Smoking will be allowed in designated areas only.

E. No horseplay is permitted on the job site.

F. Visitors or personnel not employed by the Contractor or his approved Subcontractors shall not be permitted on-site without prior approval by the Owner.

G. Owner and/or Engineer reserve the right to require that any of the Contractor's personnel be excluded from work at the site at any time.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

APPENDIX B

INSPECTION FORM

Stormwater Construction Site Inspection Report

General Information			
Project Name	MWG Will County South Ash Pond 2 Liner Replacement		
NPDES Tracking No.		**Location**	
Date of Inspection		**Start/End Time**	
Inspector's Name(s)			
Inspector's Title(s)			
Inspector's Contact Information			
Describe present phase of construction			

Type of Inspection:
☐ Regular ☐ Pre-storm event ☐ During storm event ☐ Post-storm event

Weather Information

Has there been a storm event since the last inspection? ☐Yes ☐No
If yes, provide:
Storm Start Date & Time: Storm Duration (hrs): Approximate Amount of Precipitation (in):

Weather at time of this inspection?
☐ Clear ☐Cloudy ☐ Rain ☐ Sleet ☐ Fog ☐ Snowing ☐ High Winds
☐ Other: Temperature:

Have any discharges occurred since the last inspection? ☐Yes ☐No
If yes, describe:

Are there any discharges at the time of inspection? ☐Yes ☐No
If yes, describe:

Site-specific BMPs

- *Number the structural and non-structural BMPs identified in your SWPPP on your site map and list them below (add as many BMPs as necessary). Carry a copy of the numbered site map with you during your inspections. This list will ensure that you are inspecting all required BMPs at your site.*
- *Describe corrective actions initiated, date completed, and note the person that completed the work in the Corrective Action Log.*

	BMP	BMP Installed?	BMP Maintenance Required?	Corrective Action Needed and Notes
1		☐Yes ☐No	☐Yes ☐No	
2		☐Yes ☐No	☐Yes ☐No	
3		☐Yes ☐No	☐Yes ☐No	
4		☐Yes ☐No	☐Yes ☐No	
5		☐Yes ☐No	☐Yes ☐No	
6		☐Yes ☐No	☐Yes ☐No	
7		☐Yes ☐No	☐Yes ☐No	
8		☐Yes ☐No	☐Yes ☐No	
9		☐Yes ☐No	☐Yes ☐No	
10		☐Yes ☐No	☐Yes ☐No	
11		☐Yes ☐No	☐Yes ☐No	

Overall Site Issues

Below are some general site issues that should be assessed during inspections.

	BMP/activity	Implemented?	Maintenance Required?	Corrective Action Needed and Notes
1	Are all slopes and disturbed areas not actively being worked properly stabilized?	☐Yes ☐No	☐Yes ☐No	
2	Are natural resource areas (e.g., streams, wetlands, mature trees, etc.) protected with barriers or similar BMPs?	☐Yes ☐No	☐Yes ☐No	
3	Are perimeter controls and sediment barriers adequately installed (keyed into substrate) and maintained?	☐Yes ☐No	☐Yes ☐No	
4	Is the construction exit preventing sediment from being tracked into the street?	☐Yes ☐No	☐Yes ☐No	
5	Is trash/litter from construction work area collected and placed in covered dumpsters?	☐Yes ☐No	☐Yes ☐No	
6	Are vehicle and equipment fueling, cleaning, and maintenance areas free of spills, leaks, or any other deleterious material?	☐Yes ☐No	☐Yes ☐No	
7	Are materials that are potential stormwater contaminants stored inside or under cover?	☐Yes ☐No	☐Yes ☐No	
8	Are non-stormwater discharges (e.g., wash water, dewatering) properly controlled?	☐Yes ☐No	☐Yes ☐No	

Non-Compliance

Describe any incidents of non-compliance not described above:

CERTIFICATION STATEMENT

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Print name and title: ______________________________

Signature:______________________________ **Date:**____________________

APPENDIX B

POZ-O-PAC MATERIAL LABORATORY TEST RESULTS

ANALYTICAL REPORT

Job Number: 500-19261-1

Job Description: Will County 3S Ash Pond Poz-o-Pac

For:
Midwest Generation EME LLC
529 E 135th Street
Romeoville, IL 60446-1538

Attention: Beckie Maddox

Approved for release.
Bonnie M Stadelmann
Project Manager II
6/18/2009 1:47 PM

Bonnie Stadelmann

Bonnie M Stadelmann
Project Manager II
bonnie.stadelmann@testamericainc.com
06/18/2009

cc: Ms. Maria Race

These test results meet all the requirements of NELAC for accredited parameters.

The Lab Certification ID#:
TestAmerica Chicago 100201
TestAmerica North Canton 9503
TestAmerica St. Louis MO00054

All questions regarding this test report should be directed to the TestAmerica Project Manager whose signature appears on this report. All pages of this report are integral parts of the analytical data. Therefore, this report should be reproduced only in its entirety.

Reporting limits are adjusted for sample size used, dilutions and moisture content if applicable.

ACCREDITED IN ACCORDANCE WITH nelac

Job Narrative
500-J19261-1

Comments
No additional comments.

Receipt
All samples were received in good condition within temperature requirements.

GC/MS VOA
No analytical or quality issues were noted.

GC/MS Semi VOA
Method(s) 8270C: Internal standard (ISTD) response for the following sample(s) was outside of acceptance limits: 3S ASH POND BORING (500-19261-1). The sample(s) was not re-analyzed as there were no hits associated with these internal standards.

Method(s) 8270C: One surrogate has a recovery below the method/QAPP stated surrogate limit, but greater than 10%. No corrective action was required per the method. 3S ASH POND BORING (500-19261-1)

Method(s) 8270C: Internal standard (ISTD) response for the following sample(s) was outside of acceptance limits: TCLP blank LB 500-65336 (8270). The sample(s) was not re-analyzed as there were no hits assoiciated with these Internal Standards.

No other analytical or quality issues were noted.

GC Semi VOA
Method(s) 8081A: The grand mean exception, as outlined in EPA Method 8000B, was applied to continuing calibration verification (CCV) standards. This rule states that when one or more compounds in the CCV fail to meet acceptance criteria, the initial calibration (ICAL) may be used for quantitation if the average %D (the grand mean) of all the compounds in the CCV is less than or equal to 30 %D.

Method(s) 8151A: The grand mean exception, as outlined in EPA Method 8000B, was applied to continuing calibration verification (CCV) standards. This rule states that when one or more compounds in the CCV fail to meet acceptance criteria, the initial calibration (ICAL) may be used for quantitation if the average %D (the grand mean) of all the compounds in the CCV is less than or equal to 15 %D.3S ASH POND BORING (500-19261-1)

No other analytical or quality issues were noted.

Metals
No analytical or quality issues were noted.

General Chemistry
No analytical or quality issues were noted.

Organic Prep
No analytical or quality issues were noted.

SAMPLE SUMMARY

Client: Midwest Generation EME LLC

Job Number: 500-19261-1

Lab Sample ID	Client Sample ID	Client Matrix	Date/Time Sampled	Date/Time Received
500-19261-1	3S ASH POND BORING	Solid	06/03/2009 1530	06/04/2009 1105

Beckie Maddox
Midwest Generation EME LLC
529 E 135th Street
Romeoville, IL 60446-1538

Job Number: 500-19261-1

Client Sample ID: 3S ASH POND BORING
Lab Sample ID: 500-19261-1

Date Sampled: 06/03/2009 1530
Date Received: 06/04/2009 1105
Client Matrix: Solid

Analyte	Result/Qualifier		Unit	RL	Dilution
Method: TCLP-8260B			Date Analyzed:	06/08/2009 2148	
Prep Method: 5030B			Date Prepared:	06/08/2009 2148	
Benzene	<0.0040		mg/L	0.0040	20
Carbon tetrachloride	<0.0040		mg/L	0.0040	20
Chlorobenzene	<0.0040		mg/L	0.0040	20
Chloroform	<0.0040		mg/L	0.0040	20
1,2-Dichloroethane	<0.0040		mg/L	0.0040	20
1,1-Dichloroethene	<0.0040		mg/L	0.0040	20
Methyl ethyl ketone (MEK)	<0.020		mg/L	0.020	20
Tetrachloroethene	<0.0040		mg/L	0.0040	20
Trichloroethene	<0.0040		mg/L	0.0040	20
Vinyl chloride	<0.0040		mg/L	0.0040	20
Surrogate				Acceptance Limits	
4-Bromofluorobenzene (Surr)	99		%	75 - 120	
1,2-Dichloroethane-d4 (Surr)	105		%	70 - 125	
Toluene-d8 (Surr)	103		%	75 - 120	
Dibromofluoromethane	109		%	75 - 120	
Method: TCLP-8270C			Date Analyzed:	06/09/2009 1829	
Prep Method: 3510C			Date Prepared:	06/08/2009 0731	
1,4-Dichlorobenzene	<0.10		mg/L	0.10	1.0
2,4-Dinitrotoluene	<0.10		mg/L	0.10	1.0
Hexachlorobenzene	<0.10		mg/L	0.10	1.0
Hexachloro-1,3-butadiene	<0.10		mg/L	0.10	1.0
Hexachloroethane	<0.10		mg/L	0.10	1.0
2-Methyl-phenol	<0.10		mg/L	0.10	1.0
3 & 4 Methylphenol	<0.10		mg/L	0.10	1.0
Nitrobenzene	<0.10		mg/L	0.10	1.0
Pentachlorophenol	<0.50		mg/L	0.50	1.0
Pyridine	<0.20		mg/L	0.20	1.0
2,4,5-Trichlorophenol	<0.50		mg/L	0.50	1.0
2,4,6-Trichlorophenol	<0.10		mg/L	0.10	1.0
Total Cresols, TCEQ Definition	<0.10		mg/L	0.10	1.0
Surrogate				Acceptance Limits	
2-Fluorobiphenyl	48		%	37 - 120	
2-Fluorophenol	27		%	20 - 110	
Nitrobenzene-d5	46		%	36 - 120	
Phenol-d5	18	X	%	20 - 110	
Terphenyl-d14	80		%	24 - 134	
2,4,6-Tribromophenol	60		%	37 - 134	

Client Sample ID: 3S ASH POND BORING
Lab Sample ID: 500-19261-1

Date Sampled: 06/03/2009 1530
Date Received: 06/04/2009 1105
Client Matrix: Solid

Analyte	Result/Qualifier	Unit	RL	Dilution
Method: TCLP-8081A		Date Analyzed:	06/09/2009 0025	
Prep Method: 3510C		Date Prepared:	06/08/2009 0729	
Chlordane (technical)	<0.010	mg/L	0.010	1.0
Endrin	<0.0050	mg/L	0.0050	1.0
Heptachlor	<0.0050	mg/L	0.0050	1.0
Heptachlor epoxide	<0.0050	mg/L	0.0050	1.0
gamma-BHC (Lindane)	<0.0050	mg/L	0.0050	1.0
Methoxychlor	<0.010	mg/L	0.010	1.0
Toxaphene	<0.050	mg/L	0.050	1.0
Surrogate			Acceptance Limits	
DCB Decachlorobiphenyl	108	%	20 - 120	
Tetrachloro-m-xylene	95	%	31 - 121	
Method: 8082		Date Analyzed:	06/11/2009 1533	
Prep Method: 3541		Date Prepared:	06/09/2009 0729	
PCB-1016	<17	ug/Kg	17	1.0
PCB-1221	<17	ug/Kg	17	1.0
PCB-1232	<17	ug/Kg	17	1.0
PCB-1242	<17	ug/Kg	17	1.0
PCB-1248	<17	ug/Kg	17	1.0
PCB-1254	<17	ug/Kg	17	1.0
PCB-1260	<17	ug/Kg	17	1.0
Surrogate			Acceptance Limits	
Tetrachloro-m-xylene	72	%	30 - 120	
DCB Decachlorobiphenyl	75	%	40 - 141	
Method: TCLP-8151A		Date Analyzed:	06/11/2009 2044	
Prep Method: 8151A		Date Prepared:	06/11/2009 0848	
2,4-D	<0.10	mg/L	0.10	1.0
Silvex (2,4,5-TP)	<0.010	mg/L	0.010	1.0
Surrogate			Acceptance Limits	
DCAA	43	%	42 - 120	
Method: TCLP-6010B		Date Analyzed:	06/08/2009 1424	
Prep Method: 3010A		Date Prepared:	06/08/2009 0800	
Arsenic	<0.050	mg/L	0.050	1.0
Barium	0.64	mg/L	0.50	1.0
Cadmium	<0.0050	mg/L	0.0050	1.0
Chromium	<0.025	mg/L	0.025	1.0
Lead	<0.0075	mg/L	0.0075	1.0
Selenium	<0.050	mg/L	0.050	1.0

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Client Sample ID: 3S ASH POND BORING
Lab Sample ID: 500-19261-1

Date Sampled: 06/03/2009 1530
Date Received: 06/04/2009 1105
Client Matrix: Solid

Analyte	Result/Qualifier	Unit	RL	Dilution
Silver	<0.025	mg/L	0.025	1.0
Method: TCLP-7470A		Date Analyzed:	06/08/2009 1333	
Prep Method: 7470A		Date Prepared:	06/08/2009 0930	
Mercury	<0.0020	mg/L	0.0020	1.0
Method: 9014		Date Analyzed:	06/08/2009 1358	
Prep Method: 9010B		Date Prepared:	06/08/2009 1050	
Cyanide, Reactive	<0.44	mg/Kg	0.44	1.0
Method: 9023		Date Analyzed:	06/12/2009 1000	
Halogens, Extractable Organic	<20	mg/Kg	20	1.0
Method: 9034		Date Analyzed:	06/08/2009 1448	
Prep Method: 7.3.4		Date Prepared:	06/08/2009 1153	
Sulfide, Reactive	<49	mg/Kg	49	1.0
Method: 9045C		Date Analyzed:	06/05/2009 1729	
pH	9.55	SU	0.200	1.0
Method: 9066		Date Analyzed:	06/13/2009 1002	
Prep Method: Distill/Phenol		Date Prepared:	06/12/2009 0900	
Phenolics, Total Recoverable	<0.38	mg/Kg	0.38	1.0
Method: 9095A		Date Analyzed:	06/16/2009 1620	
Paint Filter	pass	mL/100g		1.0
Method: D92		Date Analyzed:	06/17/2009 0845	
Flashpoint	>200	Fahrenheit	40	1.0
Method: Moisture		Date Analyzed:	06/07/2009 2126	
Percent Moisture	1.5	%	0.10	1.0

QUALITY CONTROL RESULTS

QC Association Summary

Lab Sample ID	Client Sample ID	Report Basis	Client Matrix	Method	Prep Batch
GC/MS VOA					
Prep Batch: 500-65339					
LB 500-65339/1-A	TCLP SPLPE Leachate Blank	P	Solid	1311	
500-19261-1	3S ASH POND BORING	P	Solid	1311	
Analysis Batch:500-65430					
LB 500-65339/1-A	TCLP SPLPE Leachate Blank	P	Solid	8260B	
LCS 500-65430/5	Lab Control Sample	T	Water	8260B	
MB 500-65430/4	Method Blank	T	Water	8260B	
500-19261-1	3S ASH POND BORING	P	Solid	8260B	

Report Basis
P = TCLP
T = Total

Lab Sample ID	Client Sample ID	Report Basis	Client Matrix	Method	Prep Batch
GC/MS Semi VOA					
Prep Batch: 500-65336					
LB 500-65336/1-C	TCLP SPLPE Leachate Blank	P	Solid	1311	
500-19261-1	3S ASH POND BORING	P	Solid	1311	
500-19261-1MS	Matrix Spike	P	Solid	1311	
Prep Batch: 500-65368					
LCS 500-65368/2-A	Lab Control Sample	T	Water	3510C	
MB 500-65368/1-A	Method Blank	T	Water	3510C	
LB 500-65336/1-C	TCLP SPLPE Leachate Blank	P	Solid	3510C	500-65336
500-19261-1	3S ASH POND BORING	P	Solid	3510C	500-65336
500-19261-1MS	Matrix Spike	P	Solid	3510C	500-65336
Analysis Batch:500-65428					
LB 500-65336/1-C	TCLP SPLPE Leachate Blank	P	Solid	8270C	500-65368
LCS 500-65368/2-A	Lab Control Sample	T	Water	8270C	500-65368
MB 500-65368/1-A	Method Blank	T	Water	8270C	500-65368
500-19261-1MS	Matrix Spike	P	Solid	8270C	500-65368
Analysis Batch:500-65573					
500-19261-1	3S ASH POND BORING	P	Solid	8270C	500-65368

Report Basis
P = TCLP
T = Total

QC Association Summary

Lab Sample ID	Client Sample ID	Report Basis	Client Matrix	Method	Prep Batch
GC Semi VOA					
Prep Batch: 500-65336					
LB 500-65336/1-B	TCLP SPLPE Leachate Blank	P	Solid	1311	
LB 500-65336/1-F	TCLP SPLPE Leachate Blank	P	Solid	1311	
500-19261-1	3S ASH POND BORING	P	Solid	1311	
500-19261-1MS	Matrix Spike	P	Solid	1311	
Prep Batch: 500-65367					
LCS 500-65367/2-A	Lab Control Sample	T	Water	3510C	
LCS 500-65367/3-A	Lab Control Sample	T	Water	3510C	
MB 500-65367/1-A	Method Blank	T	Water	3510C	
LB 500-65336/1-B	TCLP SPLPE Leachate Blank	P	Solid	3510C	500-65336
500-19261-1	3S ASH POND BORING	P	Solid	3510C	500-65336
500-19261-1MS	Matrix Spike	P	Solid	3510C	500-65336
Prep Batch: 500-65448					
LCS 500-65448/2-A	Lab Control Sample	T	Solid	3541	
MB 500-65448/1-A	Method Blank	T	Solid	3541	
500-19261-1	3S ASH POND BORING	T	Solid	3541	
Analysis Batch:500-65575					
LB 500-65336/1-B	TCLP SPLPE Leachate Blank	P	Solid	8081A	500-65367
LCS 500-65367/2-A	Lab Control Sample	T	Water	8081A	500-65367
LCS 500-65367/3-A	Lab Control Sample	T	Water	8081A	500-65367
MB 500-65367/1-A	Method Blank	T	Water	8081A	500-65367
500-19261-1	3S ASH POND BORING	P	Solid	8081A	500-65367
500-19261-1MS	Matrix Spike	P	Solid	8081A	500-65367
Prep Batch: 500-65641					
LCS 500-65641/2-A	Lab Control Sample	T	Water	8151A	
MB 500-65641/1-A	Method Blank	T	Water	8151A	
LB 500-65336/1-F	TCLP SPLPE Leachate Blank	P	Solid	8151A	500-65336
500-19261-1	3S ASH POND BORING	P	Solid	8151A	500-65336
500-19261-1MS	Matrix Spike	P	Solid	8151A	500-65336
Analysis Batch:500-65740					
LCS 500-65448/2-A	Lab Control Sample	T	Solid	8082	500-65448
MB 500-65448/1-A	Method Blank	T	Solid	8082	500-65448
500-19261-1	3S ASH POND BORING	T	Solid	8082	500-65448
Analysis Batch:500-65746					
LB 500-65336/1-F	TCLP SPLPE Leachate Blank	P	Solid	8151A	500-65641
LCS 500-65641/2-A	Lab Control Sample	T	Water	8151A	500-65641
MB 500-65641/1-A	Method Blank	T	Water	8151A	500-65641
500-19261-1	3S ASH POND BORING	P	Solid	8151A	500-65641
500-19261-1MS	Matrix Spike	P	Solid	8151A	500-65641

QC Association Summary

Lab Sample ID	Client Sample ID	Report Basis	Client Matrix	Method	Prep Batch

Report Basis
P = TCLP
T = Total

Metals

Lab Sample ID	Client Sample ID	Report Basis	Client Matrix	Method	Prep Batch
Prep Batch: 500-65336					
LB 500-65336/1-D	TCLP SPLPE Leachate Blank	P	Solid	1311	
LB 500-65336/1-E	TCLP SPLPE Leachate Blank	P	Solid	1311	
500-19261-1	3S ASH POND BORING	P	Solid	1311	
Prep Batch: 500-65395					
LCS 500-65395/2-A	Lab Control Sample	T	Water	3010A	
LB 500-65336/1-D	TCLP SPLPE Leachate Blank	P	Solid	3010A	500-65336
500-19261-1	3S ASH POND BORING	P	Solid	3010A	500-65336
Prep Batch: 500-65419					
LCS 500-65419/2-A	Lab Control Sample	T	Water	7470A	
MB 500-65419/1-A	Method Blank	T	Water	7470A	
LB 500-65336/1-E	TCLP SPLPE Leachate Blank	P	Solid	7470A	500-65336
500-19261-1	3S ASH POND BORING	P	Solid	7470A	500-65336
Analysis Batch:500-65426					
LB 500-65336/1-E	TCLP SPLPE Leachate Blank	P	Solid	7470A	500-65419
LCS 500-65419/2-A	Lab Control Sample	T	Water	7470A	500-65419
MB 500-65419/1-A	Method Blank	T	Water	7470A	500-65419
500-19261-1	3S ASH POND BORING	P	Solid	7470A	500-65419
Analysis Batch:500-65446					
LB 500-65336/1-D	TCLP SPLPE Leachate Blank	P	Solid	6010B	500-65395
LCS 500-65395/2-A	Lab Control Sample	T	Water	6010B	500-65395
500-19261-1	3S ASH POND BORING	P	Solid	6010B	500-65395

Report Basis
P = TCLP
T = Total

QC Association Summary

Lab Sample ID	Client Sample ID	Report Basis	Client Matrix	Method	Prep Batch
General Chemistry					
Prep Batch: 500-65342					
LCS 500-65342/2-A	Lab Control Sample	T	Solid	7.3.4	
MB 500-65342/1-A	Method Blank	T	Solid	7.3.4	
500-19261-1	3S ASH POND BORING	T	Solid	7.3.4	
500-19261-1MS	Matrix Spike	T	Solid	7.3.4	
500-19261-1MSD	Matrix Spike Duplicate	T	Solid	7.3.4	
Analysis Batch:500-65362					
500-19261-1	3S ASH POND BORING	T	Solid	Moisture	
Analysis Batch:500-65373					
500-19261-1	3S ASH POND BORING	T	Solid	9045C	
Prep Batch: 500-65386					
LCS 500-65386/2-A	Lab Control Sample	T	Solid	9010B	
MB 500-65386/1-A	Method Blank	T	Solid	9010B	
500-19261-1	3S ASH POND BORING	T	Solid	9010B	
Analysis Batch:500-65431					
LCS 500-65342/2-A	Lab Control Sample	T	Solid	9034	500-65342
MB 500-65342/1-A	Method Blank	T	Solid	9034	500-65342
500-19261-1	3S ASH POND BORING	T	Solid	9034	500-65342
500-19261-1MS	Matrix Spike	T	Solid	9034	500-65342
500-19261-1MSD	Matrix Spike Duplicate	T	Solid	9034	500-65342
Analysis Batch:500-65435					
LCS 500-65386/2-A	Lab Control Sample	T	Solid	9014	500-65386
MB 500-65386/1-A	Method Blank	T	Solid	9014	500-65386
500-19261-1	3S ASH POND BORING	T	Solid	9014	500-65386
Prep Batch: 500-65786					
LCS 500-65786/18-A	Lab Control Sample	T	Solid	Distill/Phenol	
MB 500-65786/17-A	Method Blank	T	Solid	Distill/Phenol	
500-19261-1	3S ASH POND BORING	T	Solid	Distill/Phenol	
500-19261-1MS	Matrix Spike	T	Solid	Distill/Phenol	
500-19261-1MSD	Matrix Spike Duplicate	T	Solid	Distill/Phenol	
Analysis Batch:500-65787					
LCS 500-65786/18-A	Lab Control Sample	T	Solid	9066	500-65786
MB 500-65786/17-A	Method Blank	T	Solid	9066	500-65786
500-19261-1	3S ASH POND BORING	T	Solid	9066	500-65786
500-19261-1MS	Matrix Spike	T	Solid	9066	500-65786
500-19261-1MSD	Matrix Spike Duplicate	T	Solid	9066	500-65786
Analysis Batch:500-65948					
500-19261-1	3S ASH POND BORING	T	Solid	9095A	

QC Association Summary

Lab Sample ID	Client Sample ID	Report Basis	Client Matrix	Method	Prep Batch
General Chemistry					
Analysis Batch:500-66037					
500-19261-1	3S ASH POND BORING	T	Solid	D92	
Analysis Batch:680-140283					
LCS 680-140283/2	Lab Control Sample	T	Solid	9023	
MB 680-140283/1	Method Blank	T	Solid	9023	
500-19261-1	3S ASH POND BORING	T	Solid	9023	
500-19261-1MS	Matrix Spike	T	Solid	9023	
500-19261-1MSD	Matrix Spike Duplicate	T	Solid	9023	

Report Basis
T = Total

Quality Control Results

Client: Midwest Generation EME LLC

Job Number: 500-19261-1

Method Blank - Batch: 500-65430

Method: 8260B
Preparation: 5030B

Lab Sample ID: MB 500-65430/4
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 06/08/2009 1233
Date Prepared: 06/08/2009 1233

Analysis Batch: 500-65430
Prep Batch: N/A
Units: mg/L

Instrument ID: Agilent 6890N GC - 5973N
Lab File ID: 6M0608A.D
Initial Weight/Volume: 10 mL
Final Weight/Volume: 10 mL

Analyte	Result	Qual	RL
Benzene	<0.0010		0.0010
Carbon tetrachloride	<0.0010		0.0010
Chlorobenzene	<0.0010		0.0010
Chloroform	<0.0010		0.0010
1,2-Dichloroethane	<0.0010		0.0010
1,1-Dichloroethene	<0.0010		0.0010
Methyl ethyl ketone (MEK)	<0.0050		0.0050
Tetrachloroethene	<0.0010		0.0010
Trichloroethene	<0.0010		0.0010
Vinyl chloride	<0.0010		0.0010

Surrogate	% Rec	Acceptance Limits
4-Bromofluorobenzene (Surr)	98	75 - 120
1,2-Dichloroethane-d4 (Surr)	104	70 - 125
Toluene-d8 (Surr)	101	75 - 120
Dibromofluoromethane	102	75 - 120

Calculations are performed before rounding to avoid round-off errors in calculated results.

TCLP SPLPE Leachate Blank - Batch: 500-65430

Method: 8260B
Preparation: 5030B
TCLP

Lab Sample ID: LB 500-65339/1-A
Client Matrix: Solid
Dilution: 20
Date Analyzed: 06/08/2009 1319
Date Prepared: 06/08/2009 1319
Date Leached: 06/05/2009 1404

Analysis Batch: 500-65430
Prep Batch: N/A
Units: mg/L
Leachate Batch: 500-65339

Instrument ID: Agilent 6890N GC - 5973N
Lab File ID: 6X0608.D
Initial Weight/Volume: 10 mL
Final Weight/Volume: 10 mL

Analyte	Result	Qual	RL
Benzene	<0.020		0.020
Carbon tetrachloride	<0.020		0.020
Chlorobenzene	<0.020		0.020
Chloroform	<0.020		0.020
1,2-Dichloroethane	<0.020		0.020
1,1-Dichloroethene	<0.020		0.020
Methyl ethyl ketone (MEK)	<0.10		0.10
Tetrachloroethene	<0.020		0.020
Trichloroethene	<0.020		0.020
Vinyl chloride	<0.020		0.020

Surrogate	% Rec	Acceptance Limits
4-Bromofluorobenzene (Surr)	99	75 - 120
1,2-Dichloroethane-d4 (Surr)	96	70 - 125
Toluene-d8 (Surr)	99	75 - 120
Dibromofluoromethane	94	75 - 120

Calculations are performed before rounding to avoid round-off errors in calculated results.

Quality Control Results

Client: Midwest Generation EME LLC

Job Number: 500-19261-1

Lab Control Sample - Batch: 500-65430

Method: 8260B
Preparation: 5030B

Lab Sample ID: LCS 500-65430/5
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 06/08/2009 1209
Date Prepared: 06/08/2009 1209

Analysis Batch: 500-65430
Prep Batch: N/A
Units: mg/L

Instrument ID: Agilent 6890N GC - 5973N
Lab File ID: 6S0608.D
Initial Weight/Volume: 10 mL
Final Weight/Volume: 10 mL

Analyte	Spike Amount	Result	% Rec.	Limit	Qual
Benzene	0.0250	0.0240	96	68 - 120	
Carbon tetrachloride	0.0250	0.0252	101	67 - 121	
Chlorobenzene	0.0250	0.0236	94	75 - 120	
Chloroform	0.0250	0.0241	96	65 - 127	
1,2-Dichloroethane	0.0250	0.0243	97	68 - 120	
1,1-Dichloroethene	0.0250	0.0246	99	50 - 121	
Methyl ethyl ketone (MEK)	0.0250	0.0243	97	36 - 157	
Tetrachloroethene	0.0250	0.0231	93	65 - 120	
Trichloroethene	0.0250	0.0248	99	73 - 120	
Vinyl chloride	0.0250	0.0291	116	57 - 135	

Surrogate	% Rec	Acceptance Limits
4-Bromofluorobenzene (Surr)	98	75 - 120
1,2-Dichloroethane-d4 (Surr)	97	70 - 125
Toluene-d8 (Surr)	101	75 - 120
Dibromofluoromethane	100	75 - 120

Calculations are performed before rounding to avoid round-off errors in calculated results.

Quality Control Results

Client: Midwest Generation EME LLC

Job Number: 500-19261-1

Method Blank - Batch: 500-65368

Method: 8270C
Preparation: 3510C

Lab Sample ID: MB 500-65368/1-A
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 06/08/2009 1427
Date Prepared: 06/08/2009 0731

Analysis Batch: 500-65428
Prep Batch: 500-65368
Units: mg/L

Instrument ID: Agilent 6890N GC - 5973N
Lab File ID: 65368M.D
Initial Weight/Volume: 1000 mL
Final Weight/Volume: 1.0 mL
Injection Volume: 1.0 uL

Analyte	Result	Qual	RL
1,4-Dichlorobenzene	<0.010		0.010
2,4-Dinitrotoluene	<0.010		0.010
Hexachlorobenzene	<0.010		0.010
Hexachloro-1,3-butadiene	<0.010		0.010
Hexachloroethane	<0.010		0.010
2-Methyl-phenol	<0.010		0.010
3 & 4 Methylphenol	<0.010		0.010
Nitrobenzene	<0.010		0.010
Pentachlorophenol	<0.050		0.050
Pyridine	<0.020		0.020
2,4,5-Trichlorophenol	<0.050		0.050
2,4,6-Trichlorophenol	<0.010		0.010
Total Cresols, TCEQ Definition	<0.010		0.010

Surrogate	% Rec	Acceptance Limits
2-Fluorobiphenyl	55	37 - 120
2-Fluorophenol	31	20 - 110
Nitrobenzene-d5	49	36 - 120
Phenol-d5	22	20 - 110
Terphenyl-d14	86	24 - 134
2,4,6-Tribromophenol	64	37 - 134

Calculations are performed before rounding to avoid round-off errors in calculated results.

TCLP SPLPE Leachate Blank - Batch: 500-65368

Method: 8270C
Preparation: 3510C
TCLP

Lab Sample ID:	LB 500-65336/1-C	Analysis Batch:	500-65428	Instrument ID:	Agilent 6890N GC - 5973N
Client Matrix:	Solid	Prep Batch:	500-65368	Lab File ID:	65336LB.D
Dilution:	1.0	Units:	mg/L	Initial Weight/Volume:	100 mL
Date Analyzed:	06/08/2009 1541			Final Weight/Volume:	1.0 mL
Date Prepared:	06/08/2009 0731			Injection Volume:	1.0 uL
Date Leached:	06/05/2009 1357	Leachate Batch:	500-65336		

Analyte	Result	Qual	RL
1,4-Dichlorobenzene	<0.10		0.10
2,4-Dinitrotoluene	<0.10		0.10
Hexachlorobenzene	<0.10		0.10
Hexachloro-1,3-butadiene	<0.10		0.10
Hexachloroethane	<0.10		0.10
2-Methyl-phenol	<0.10		0.10
3 & 4 Methylphenol	<0.10		0.10
Nitrobenzene	<0.10		0.10
Pentachlorophenol	<0.50		0.50
Pyridine	<0.20		0.20
2,4,5-Trichlorophenol	<0.50		0.50
2,4,6-Trichlorophenol	<0.10		0.10
Total Cresols, TCEQ Definition	<0.10		0.10

Surrogate	% Rec	Acceptance Limits
2-Fluorobiphenyl	64	37 - 120
2-Fluorophenol	35	20 - 110
Nitrobenzene-d5	59	36 - 120
Phenol-d5	24	20 - 110
Terphenyl-d14	91	24 - 134
2,4,6-Tribromophenol	77	37 - 134

Calculations are performed before rounding to avoid round-off errors in calculated results.

Lab Control Sample - Batch: 500-65368

Method: 8270C
Preparation: 3510C

Lab Sample ID:	LCS 500-65368/2-A	Analysis Batch: 500-65428		Instrument ID:	Agilent 6890N GC - 5973N
Client Matrix:	Water	Prep Batch: 500-65368		Lab File ID:	65368BS.D
Dilution:	1.0	Units: mg/L		Initial Weight/Volume:	1000 mL
Date Analyzed:	06/08/2009 1452			Final Weight/Volume:	1.0 mL
Date Prepared:	06/08/2009 0731			Injection Volume:	1.0 uL

Analyte	Spike Amount	Result	% Rec.	Limit	Qual
1,4-Dichlorobenzene	0.0500	0.0322	64	39 - 110	
2,4-Dinitrotoluene	0.0500	0.0447	89	64 - 119	
Hexachlorobenzene	0.0500	0.0468	94	57 - 116	
Hexachloro-1,3-butadiene	0.0500	0.0383	77	34 - 110	
Hexachloroethane	0.0500	0.0313	63	34 - 110	
2-Methyl-phenol	0.0500	0.0322	64	39 - 110	
3 & 4 Methylphenol	0.0500	0.0317	63	35 - 110	
Nitrobenzene	0.0500	0.0357	71	54 - 111	
Pentachlorophenol	0.0500	<0.050	94	32 - 124	
Pyridine	0.0500	<0.020	33	10 - 110	
2,4,5-Trichlorophenol	0.0500	<0.050	80	63 - 118	
2,4,6-Trichlorophenol	0.0500	0.0401	80	58 - 116	

Surrogate	% Rec	Acceptance Limits
2-Fluorobiphenyl	78	37 - 120
2-Fluorophenol	45	20 - 110
Nitrobenzene-d5	72	36 - 120
Phenol-d5	31	20 - 110
Terphenyl-d14	92	24 - 134
2,4,6-Tribromophenol	97	37 - 134

Calculations are performed before rounding to avoid round-off errors in calculated results.

Quality Control Results

Client: Midwest Generation EME LLC

Job Number: 500-19261-1

Matrix Spike - Batch: 500-65368

Method: 8270C
Preparation: 3510C
TCLP

Lab Sample ID: 500-19261-1
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 06/08/2009 1656
Date Prepared: 06/08/2009 0731
Date Leached: 06/05/2009 1357

Analysis Batch: 500-65428
Prep Batch: 500-65368
Units: mg/L
Leachate Batch: 500-65336

Instrument ID: Agilent 6890N GC - 5973N
Lab File ID: 19261-1S.D
Initial Weight/Volume: 100 mL
Final Weight/Volume: 1.0 mL
Injection Volume: 1.0 uL

Analyte	Sample Result/Qual	Spike Amount	Result	% Rec.	Limit	Qual
1,4-Dichlorobenzene	<0.10	0.500	0.284	57	39 - 110	
2,4-Dinitrotoluene	<0.10	0.500	0.505	101	64 - 119	
Hexachlorobenzene	<0.10	0.500	0.485	97	57 - 116	
Hexachloro-1,3-butadiene	<0.10	0.500	0.341	68	34 - 110	
Hexachloroethane	<0.10	0.500	0.277	55	34 - 110	
2-Methyl-phenol	<0.10	0.500	0.296	59	39 - 110	
3 & 4 Methylphenol	<0.10	0.500	0.276	55	35 - 110	
Nitrobenzene	<0.10	0.500	0.328	66	54 - 111	
Pentachlorophenol	<0.50	0.500	<0.50	99	32 - 124	
Pyridine	<0.20	0.500	<0.20	31	10 - 110	
2,4,5-Trichlorophenol	<0.50	0.500	<0.50	82	63 - 118	
2,4,6-Trichlorophenol	<0.10	0.500	0.402	80	58 - 116	

Surrogate	% Rec	Acceptance Limits
2-Fluorobiphenyl	76	37 - 120
2-Fluorophenol	40	20 - 110
Nitrobenzene-d5	68	36 - 120
Phenol-d5	28	20 - 110
Terphenyl-d14	92	24 - 134
2,4,6-Tribromophenol	109	37 - 134

Calculations are performed before rounding to avoid round-off errors in calculated results.

Method Blank - Batch: 500-65367

Method: 8081A
Preparation: 3510C

Lab Sample ID:	MB 500-65367/1-A	Analysis Batch:	500-65575	Instrument ID:	HP 6890 GC
Client Matrix:	Water	Prep Batch:	500-65367	Lab File ID:	06080915_027.d
Dilution:	1.0	Units:	mg/L	Initial Weight/Volume:	1000 mL
Date Analyzed:	06/08/2009 2244			Final Weight/Volume:	10.0 mL
Date Prepared:	06/08/2009 0729			Injection Volume:	1.0 uL
				Column ID:	PRIMARY

Analyte	Result	Qual	RL
Chlordane (technical)	<0.00010		0.00010
Endrin	<0.000050		0.000050
Heptachlor	<0.000050		0.000050
Heptachlor epoxide	<0.000050		0.000050
gamma-BHC (Lindane)	<0.000050		0.000050
Methoxychlor	<0.00010		0.00010
Toxaphene	<0.00050		0.00050

Surrogate	% Rec	Acceptance Limits
DCB Decachlorobiphenyl	107	20 - 120
Tetrachloro-m-xylene	89	31 - 121

TCLP SPLPE Leachate Blank - Batch: 500-65367

Method: 8081A
Preparation: 3510C
TCLP

Lab Sample ID:	LB 500-65336/1-B	Analysis Batch:	500-65575	Instrument ID:	HP 6890 GC
Client Matrix:	Solid	Prep Batch:	500-65367	Lab File ID:	06080915_030.d
Dilution:	1.0	Units:	mg/L	Initial Weight/Volume:	10 mL
Date Analyzed:	06/09/2009 0000			Final Weight/Volume:	10.0 mL
Date Prepared:	06/08/2009 0729			Injection Volume:	1.0 uL
Date Leached:	06/05/2009 1357	Leachate Batch:	500-65336	Column ID:	PRIMARY

Analyte	Result	Qual	RL
Chlordane (technical)	<0.010		0.010
Endrin	<0.0050		0.0050
Heptachlor	<0.0050		0.0050
Heptachlor epoxide	<0.0050		0.0050
gamma-BHC (Lindane)	<0.0050		0.0050
Methoxychlor	<0.010		0.010
Toxaphene	<0.050		0.050

Surrogate	% Rec	Acceptance Limits
DCB Decachlorobiphenyl	113	20 - 120
Tetrachloro-m-xylene	87	31 - 121

Calculations are performed before rounding to avoid round-off errors in calculated results.

Lab Control Sample - Batch: 500-65367

Method: 8081A
Preparation: 3510C

Lab Sample ID:	LCS 500-65367/2-A	Analysis Batch:	500-65575	Instrument ID:	HP 6890 GC
Client Matrix:	Water	Prep Batch:	500-65367	Lab File ID:	06080915_028.d
Dilution:	1.0	Units:	mg/L	Initial Weight/Volume:	1000 mL
Date Analyzed:	06/08/2009 2310			Final Weight/Volume:	10.0 mL
Date Prepared:	06/08/2009 0729			Injection Volume:	1.0 uL
				Column ID:	PRIMARY

Analyte	Spike Amount	Result	% Rec.	Limit	Qual
Endrin	0.000100	0.0000924	92	63 - 119	
Heptachlor	0.000100	0.0000883	88	69 - 110	
Heptachlor epoxide	0.000100	0.0000987	99	73 - 110	
gamma-BHC (Lindane)	0.000100	0.0000912	91	75 - 110	
Methoxychlor	0.00100	0.000932	93	67 - 113	

Surrogate	% Rec	Acceptance Limits
DCB Decachlorobiphenyl	93	20 - 120
Tetrachloro-m-xylene	89	31 - 121

Lab Control Sample - Batch: 500-65367

Method: 8081A
Preparation: 3510C

Lab Sample ID:	LCS 500-65367/3-A	Analysis Batch:	500-65575	Instrument ID:	HP 6890 GC
Client Matrix:	Water	Prep Batch:	500-65367	Lab File ID:	06080915_029.d
Dilution:	1.0	Units:	mg/L	Initial Weight/Volume:	1000 mL
Date Analyzed:	06/08/2009 2335			Final Weight/Volume:	10.0 mL
Date Prepared:	06/08/2009 0729			Injection Volume:	1.0 uL
				Column ID:	PRIMARY

Analyte	Spike Amount	Result	% Rec.	Limit	Qual
Toxaphene	0.0102	0.00930	91	69 - 116	

Surrogate	% Rec	Acceptance Limits
DCB Decachlorobiphenyl	105	20 - 120
Tetrachloro-m-xylene	87	31 - 121

Calculations are performed before rounding to avoid round-off errors in calculated results.

Quality Control Results

Client: Midwest Generation EME LLC

Job Number: 500-19261-1

Matrix Spike - Batch: 500-65367

Method: 8081A
Preparation: 3510C
TCLP

Lab Sample ID: 500-19261-1
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 06/09/2009 0050
Date Prepared: 06/08/2009 0729
Date Leached: 06/05/2009 1357

Analysis Batch: 500-65575
Prep Batch: 500-65367
Units: mg/L
Leachate Batch: 500-65336

Instrument ID: HP 6890 GC
Lab File ID: 06080915_032.d
Initial Weight/Volume: 10 mL
Final Weight/Volume: 10.0 mL
Injection Volume: 1.0 uL
Column ID: PRIMARY

Analyte	Sample Result/Qual	Spike Amount	Result	% Rec.	Limit	Qual
Endrin	<0.0050	0.0100	0.00891	89	63 - 119	
Heptachlor	<0.0050	0.0100	0.00878	88	69 - 110	
Heptachlor epoxide	<0.0050	0.0100	0.00950	95	73 - 110	
gamma-BHC (Lindane)	<0.0050	0.0100	0.00893	89	75 - 110	
Methoxychlor	<0.010	0.100	0.0927	92	67 - 113	

Surrogate	% Rec	Acceptance Limits
DCB Decachlorobiphenyl	109	20 - 120
Tetrachloro-m-xylene	91	31 - 121

Matrix Spike - Batch: 500-65367

Method: 8081A
Preparation: 3510C
TCLP

Lab Sample ID: 500-19261-1
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 06/09/2009 0115
Date Prepared: 06/08/2009 0729
Date Leached: 06/05/2009 1357

Analysis Batch: 500-65575
Prep Batch: 500-65367
Units: mg/L
Leachate Batch: 500-65336

Instrument ID: HP 6890 GC
Lab File ID: 06080915_033.d
Initial Weight/Volume: 10 mL
Final Weight/Volume: 10.0 mL
Injection Volume: 1.0 uL
Column ID: PRIMARY

Analyte	Sample Result/Qual	Spike Amount	Result	% Rec.	Limit	Qual
Toxaphene	<0.050	1.02	0.962	94	69 - 116	

Surrogate	% Rec	Acceptance Limits
DCB Decachlorobiphenyl	108	20 - 120
Tetrachloro-m-xylene	94	31 - 121

Calculations are performed before rounding to avoid round-off errors in calculated results.

Method Blank - Batch: 500-65448

Method: 8082
Preparation: 3541

Lab Sample ID:	MB 500-65448/1-A	Analysis Batch:	500-65740	Instrument ID:	Agilent 6890A Series Plus
Client Matrix:	Solid	Prep Batch:	500-65448	Lab File ID:	06040947_215.d
Dilution:	1.0	Units:	ug/Kg	Initial Weight/Volume:	15.0000 g
Date Analyzed:	06/11/2009 1506			Final Weight/Volume:	5.0 mL
Date Prepared:	06/09/2009 0729			Injection Volume:	1.0 uL
				Column ID:	PRIMARY

Analyte	Result	Qual	RL
PCB-1016	<17		17
PCB-1221	<17		17
PCB-1232	<17		17
PCB-1242	<17		17
PCB-1248	<17		17
PCB-1254	<17		17
PCB-1260	<17		17

Surrogate	% Rec	Acceptance Limits
Tetrachloro-m-xylene	43	30 - 120
DCB Decachlorobiphenyl	80	40 - 141

Lab Control Sample - Batch: 500-65448

Method: 8082
Preparation: 3541

Lab Sample ID:	LCS 500-65448/2-A	Analysis Batch:	500-65740	Instrument ID:	Agilent 6890A Series Plus
Client Matrix:	Solid	Prep Batch:	500-65448	Lab File ID:	06040947_216.d
Dilution:	1.0	Units:	ug/Kg	Initial Weight/Volume:	15.0000 g
Date Analyzed:	06/11/2009 1519			Final Weight/Volume:	5.0 mL
Date Prepared:	06/09/2009 0729			Injection Volume:	1.0 uL
				Column ID:	PRIMARY

Analyte	Spike Amount	Result	% Rec.	Limit	Qual
PCB-1016	167	113	68	46 - 119	
PCB-1260	167	119	71	58 - 123	

Surrogate	% Rec	Acceptance Limits
Tetrachloro-m-xylene	70	30 - 120
DCB Decachlorobiphenyl	80	40 - 141

Calculations are performed before rounding to avoid round-off errors in calculated results.

Method Blank - Batch: 500-65641

Method: 8151A
Preparation: 8151A

Lab Sample ID:	MB 500-65641/1-A	Analysis Batch:	500-65746	Instrument ID:	HP 5890 GC
Client Matrix:	Water	Prep Batch:	500-65641	Lab File ID:	06030930_096.d
Dilution:	1.0	Units:	mg/L	Initial Weight/Volume:	1000 mL
Date Analyzed:	06/11/2009 1926			Final Weight/Volume:	10.0 mL
Date Prepared:	06/11/2009 0848			Injection Volume:	1 uL
				Column ID:	PRIMARY

Analyte	Result	Qual	RL
2,4-D	<0.0010		0.0010
Silvex (2,4,5-TP)	<0.00010		0.00010

Surrogate	% Rec	Acceptance Limits
DCAA	100	42 - 120

TCLP SPLPE Leachate Blank - Batch: 500-65641

Method: 8151A
Preparation: 8151A
TCLP

Lab Sample ID:	LB 500-65336/1-F	Analysis Batch:	500-65746	Instrument ID:	HP 5890 GC
Client Matrix:	Solid	Prep Batch:	500-65641	Lab File ID:	06030930_098.d
Dilution:	1.0	Units:	mg/L	Initial Weight/Volume:	10 mL
Date Analyzed:	06/11/2009 2018			Final Weight/Volume:	10.0 mL
Date Prepared:	06/11/2009 0848			Injection Volume:	1 uL
Date Leached:	06/05/2009 1357	Leachate Batch:	500-65336	Column ID:	PRIMARY

Analyte	Result	Qual	RL
2,4-D	<0.10		0.10
Silvex (2,4,5-TP)	<0.010		0.010

Surrogate	% Rec	Acceptance Limits
DCAA	58	42 - 120

Calculations are performed before rounding to avoid round-off errors in calculated results.

Client: Midwest Generation EME LLC
Job Number: 500-19261-1

Lab Control Sample - Batch: 500-65641

Method: 8151A
Preparation: 8151A

Lab Sample ID: LCS 500-65641/2-A
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 06/11/2009 1952
Date Prepared: 06/11/2009 0848

Analysis Batch: 500-65746
Prep Batch: 500-65641
Units: mg/L

Instrument ID: HP 5890 GC
Lab File ID: 06030930_097.d
Initial Weight/Volume: 1000 mL
Final Weight/Volume: 10.0 mL
Injection Volume: 1 uL
Column ID: PRIMARY

Analyte	Spike Amount	Result	% Rec.	Limit	Qual
2,4-D	0.00400	0.00161	40	11 - 110	
Silvex (2,4,5-TP)	0.00400	0.00229	57	39 - 110	

Surrogate	% Rec	Acceptance Limits
DCAA	64	42 - 120

Matrix Spike - Batch: 500-65641

Method: 8151A
Preparation: 8151A
TCLP

Lab Sample ID: 500-19261-1
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 06/11/2009 2110
Date Prepared: 06/11/2009 0848
Date Leached: 06/05/2009 1357

Analysis Batch: 500-65746
Prep Batch: 500-65641
Units: mg/L
Leachate Batch: 500-65336

Instrument ID: HP 5890 GC
Lab File ID: 06030930_100.d
Initial Weight/Volume: 10 mL
Final Weight/Volume: 10.0 mL
Injection Volume: 1 uL
Column ID: PRIMARY

Analyte	Sample Result/Qual	Spike Amount	Result	% Rec.	Limit	Qual
2,4-D	<0.10	0.400	0.133	33	11 - 110	
Silvex (2,4,5-TP)	<0.010	0.400	0.207	52	39 - 110	

Surrogate	% Rec	Acceptance Limits
DCAA	64	42 - 120

Calculations are performed before rounding to avoid round-off errors in calculated results.

TCLP SPLPE Leachate Blank - Batch: 500-65395

Method: 6010B
Preparation: 3010A
TCLP

Lab Sample ID:	LB 500-65336/1-D	Analysis Batch:	500-65446	Instrument ID:	TJA ICAP 61E Trace Analy
Client Matrix:	Solid	Prep Batch:	500-65395	Lab File ID:	P50608A
Dilution:	1.0	Units:	mg/L	Initial Weight/Volume:	50 mL
Date Analyzed:	06/08/2009 1411			Final Weight/Volume:	50 mL
Date Prepared:	06/08/2009 0800				
Date Leached:	06/05/2009 1357	Leachate Batch:	500-65336		

Analyte	Result	Qual	RL
Arsenic	<0.050		0.050
Barium	<0.50		0.50
Cadmium	<0.0050		0.0050
Chromium	<0.025		0.025
Lead	<0.0075		0.0075
Selenium	<0.050		0.050
Silver	<0.025		0.025

Lab Control Sample - Batch: 500-65395

Method: 6010B
Preparation: 3010A

Lab Sample ID:	LCS 500-65395/2-A	Analysis Batch:	500-65446	Instrument ID:	TJA ICAP 61E Trace Analy
Client Matrix:	Water	Prep Batch:	500-65395	Lab File ID:	P50608A
Dilution:	1.0	Units:	mg/L	Initial Weight/Volume:	50 mL
Date Analyzed:	06/08/2009 1417			Final Weight/Volume:	50 mL
Date Prepared:	06/08/2009 0800				

Analyte	Spike Amount	Result	% Rec.	Limit	Qual
Arsenic	0.100	0.0981	98	80 - 120	
Barium	2.00	1.91	96	80 - 120	
Cadmium	0.0500	0.0499	100	80 - 120	
Chromium	0.200	0.203	102	80 - 120	
Lead	0.100	0.101	101	80 - 120	
Selenium	0.100	0.0944	94	80 - 120	
Silver	0.0500	0.0492	98	80 - 120	

Calculations are performed before rounding to avoid round-off errors in calculated results.

Method Blank - Batch: 500-65419

Method: 7470A
Preparation: 7470A

Lab Sample ID: MB 500-65419/1-A	Analysis Batch: 500-65426	Instrument ID: Leeman Labs PS200 Merc	
Client Matrix: Water	Prep Batch: 500-65419	Lab File ID: N/A	
Dilution: 1.0	Units: mg/L	Initial Weight/Volume: 25 mL	
Date Analyzed: 06/08/2009 1319		Final Weight/Volume: 25 mL	
Date Prepared: 06/08/2009 0930			

Analyte	Result	Qual	RL
Mercury	<0.00020		0.00020

TCLP SPLPE Leachate Blank - Batch: 500-65419

Method: 7470A
Preparation: 7470A
TCLP

Lab Sample ID: LB 500-65336/1-E	Analysis Batch: 500-65426	Instrument ID: Leeman Labs PS200 Merc
Client Matrix: Solid	Prep Batch: 500-65419	Lab File ID: N/A
Dilution: 1.0	Units: mg/L	Initial Weight/Volume: 2.5 mL
Date Analyzed: 06/08/2009 1324		Final Weight/Volume: 25 mL
Date Prepared: 06/08/2009 0930		
Date Leached: 06/05/2009 1357	Leachate Batch: 500-65336	

Analyte	Result	Qual	RL
Mercury	<0.0020		0.0020

Lab Control Sample - Batch: 500-65419

Method: 7470A
Preparation: 7470A

Lab Sample ID: LCS 500-65419/2-A	Analysis Batch: 500-65426	Instrument ID: Leeman Labs PS200 Merc
Client Matrix: Water	Prep Batch: 500-65419	Lab File ID: N/A
Dilution: 1.0	Units: mg/L	Initial Weight/Volume: 25 mL
Date Analyzed: 06/08/2009 1321		Final Weight/Volume: 25 mL
Date Prepared: 06/08/2009 0930		

Analyte	Spike Amount	Result	% Rec.	Limit	Qual
Mercury	0.00200	0.00198	99	80 - 120	

Calculations are performed before rounding to avoid round-off errors in calculated results.

Method Blank - Batch: 500-65386

Method: 9014
Preparation: 9010B

Lab Sample ID: MB 500-65386/1-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 06/08/2009 1356
Date Prepared: 06/08/2009 1050

Analysis Batch: 500-65435
Prep Batch: 500-65386
Units: mg/Kg

Instrument ID: ThermoSpectronic Genesys
Lab File ID: N/A
Initial Weight/Volume: 1.0000 g
Final Weight/Volume: 50 mL

Analyte	Result	Qual	RL
Cyanide, Reactive	<0.50		0.50

Lab Control Sample - Batch: 500-65386

Method: 9014
Preparation: 9010B

Lab Sample ID: LCS 500-65386/2-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 06/08/2009 1357
Date Prepared: 06/08/2009 1050

Analysis Batch: 500-65435
Prep Batch: 500-65386
Units: mg/Kg

Instrument ID: ThermoSpectronic Genesys
Lab File ID: N/A
Initial Weight/Volume: 1.0000 g
Final Weight/Volume: 50 mL

Analyte	Spike Amount	Result	% Rec.	Limit	Qual
Cyanide, Reactive	5.00	5.05	101	80 - 120	

Calculations are performed before rounding to avoid round-off errors in calculated results.

Method Blank - Batch: 680-140283

Method: 9023
Preparation: N/A

Lab Sample ID: MB 680-140283/1
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 06/12/2009 1000
Date Prepared: N/A

Analysis Batch: 680-140283
Prep Batch: N/A
Units: mg/Kg

Instrument ID: Euroglass ETS-1200 - EUF
Lab File ID: N/A
Initial Weight/Volume: 2 g
Final Weight/Volume: 10 mL

Analyte	Result	Qual	RL
Halogens, Extractable Organic	<20		20

Lab Control Sample - Batch: 680-140283

Method: 9023
Preparation: N/A

Lab Sample ID: LCS 680-140283/2
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 06/12/2009 1000
Date Prepared: N/A

Analysis Batch: 680-140283
Prep Batch: N/A
Units: mg/Kg

Instrument ID: Euroglass ETS-1200 - EUF
Lab File ID: N/A
Initial Weight/Volume: 2 g
Final Weight/Volume: 10 mL

Analyte	Spike Amount	Result	% Rec.	Limit	Qual
Halogens, Extractable Organic	50.0	67.0	134	60 - 140	

Matrix Spike/
Matrix Spike Duplicate Recovery Report - Batch: 680-140283

Method: 9023
Preparation: N/A

MS Lab Sample ID: 500-19261-1
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 06/12/2009 1000
Date Prepared: N/A

Analysis Batch: 680-140283
Prep Batch: N/A

Instrument ID: Euroglass ETS-1200 -
Lab File ID: N/A
Initial Weight/Volume: 2 g
Final Weight/Volume: 10 mL

MSD Lab Sample ID: 500-19261-1
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 06/12/2009 1000
Date Prepared: N/A

Analysis Batch: 680-140283
Prep Batch: N/A

Instrument ID: Euroglass ETS-1200 - EUF
Lab File ID: N/A
Initial Weight/Volume: 2 g
Final Weight/Volume: 10 mL

	% Rec.						
Analyte	MS	MSD	Limit	RPD	RPD Limit	MS Qual	MSD Qual
Halogens, Extractable Organic	97	118	60 - 140	20	50		

Calculations are performed before rounding to avoid round-off errors in calculated results.

Method Blank - Batch: 500-65342

Method: 9034
Preparation: 7.3.4

Lab Sample ID: MB 500-65342/1-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 06/08/2009 1445
Date Prepared: 06/08/2009 1130

Analysis Batch: 500-65431
Prep Batch: 500-65342
Units: mg/Kg

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 10.0000 g
Final Weight/Volume: 10 mL

Analyte	Result	Qual	RL
Sulfide, Reactive	<50		50

Lab Control Sample - Batch: 500-65342

Method: 9034
Preparation: 7.3.4

Lab Sample ID: LCS 500-65342/2-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 06/08/2009 1445
Date Prepared: 06/08/2009 1134

Analysis Batch: 500-65431
Prep Batch: 500-65342
Units: mg/Kg

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 10.0000 g
Final Weight/Volume: 10 mL

Analyte	Spike Amount	Result	% Rec.	Limit	Qual
Sulfide, Reactive	206	188	91	25 - 116	

Matrix Spike/ Matrix Spike Duplicate Recovery Report - Batch: 500-65342

Method: 9034
Preparation: 7.3.4

MS Lab Sample ID: 500-19261-1
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 06/08/2009 1448
Date Prepared: 06/08/2009 1158

Analysis Batch: 500-65431
Prep Batch: 500-65342

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 10.2226 g
Final Weight/Volume: 10 mL

MSD Lab Sample ID: 500-19261-1
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 06/08/2009 1449
Date Prepared: 06/08/2009 1202

Analysis Batch: 500-65431
Prep Batch: 500-65342

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 10.2025 g
Final Weight/Volume: 10 mL

	% Rec.						
Analyte	MS	MSD	Limit	RPD	RPD Limit	MS Qual	MSD Qual
Sulfide, Reactive	75	53	25 - 116	35	50		

Calculations are performed before rounding to avoid round-off errors in calculated results.

Method Blank - Batch: 500-65786

Method: 9066
Preparation: Distill/Phenol

Lab Sample ID: MB 500-65786/17-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 06/13/2009 1100
Date Prepared: 06/12/2009 0900

Analysis Batch: 500-65787
Prep Batch: 500-65786
Units: mg/Kg

Instrument ID: Seal AQ-2
Lab File ID: N/A
Initial Weight/Volume: 1 g
Final Weight/Volume: 100 mL

Analyte	Result	Qual	RL
Phenolics, Total Recoverable	<0.50		0.50

Lab Control Sample - Batch: 500-65786

Method: 9066
Preparation: Distill/Phenol

Lab Sample ID: LCS 500-65786/18-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 06/13/2009 1101
Date Prepared: 06/12/2009 0900

Analysis Batch: 500-65787
Prep Batch: 500-65786
Units: mg/Kg

Instrument ID: Seal AQ-2
Lab File ID: N/A
Initial Weight/Volume: 1 g
Final Weight/Volume: 100 mL

Analyte	Spike Amount	Result	% Rec.	Limit	Qual
Phenolics, Total Recoverable	10.0	9.87	99	90 - 110	

Matrix Spike/
Matrix Spike Duplicate Recovery Report - Batch: 500-65786

Method: 9066
Preparation: Distill/Phenol

MS Lab Sample ID: 500-19261-1
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 06/13/2009 1004
Date Prepared: 06/12/2009 0900

Analysis Batch: 500-65787
Prep Batch: 500-65786

Instrument ID: Seal AQ-2
Lab File ID: N/A
Initial Weight/Volume: 1.09 g
Final Weight/Volume: 100 mL

MSD Lab Sample ID: 500-19261-1
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 06/13/2009 1005
Date Prepared: 06/12/2009 0900

Analysis Batch: 500-65787
Prep Batch: 500-65786

Instrument ID: Seal AQ-2
Lab File ID: N/A
Initial Weight/Volume: 1.09 g
Final Weight/Volume: 100 mL

	% Rec.						
Analyte	MS	MSD	Limit	RPD	RPD Limit	MS Qual	MSD Qual
Phenolics, Total Recoverable	94	104	75 - 125	10	20		

Calculations are performed before rounding to avoid round-off errors in calculated results.

DATA REPORTING QUALIFIERS

Client: Midwest Generation EME LLC

Job Number: 500-19261-1

Lab Section	Qualifier	Description
GC/MS Semi VOA		
	X	Surrogate exceeds the control limits

M

SEVERN TRENT **STL**

Chicago Laboratory
2417 Bond Street
University Park, IL 60466
Phone: 708-534-5200
Fax: 708-534-5211

Report To:
Contact: Beckie Maddox
Company: Midwest Generation--Will County Station
Address: 529 East 135th Street
Romeoville, Il 60446
Phone: 815-372-4589
Fax: 815-886-4296

Bill To:
Contact: ______
Company: ______
Address: ______
Phone: ______
Fax: ______
PO#: ______ Quote: ______

Shaded Areas For Internal Use Only ___ of ___

Lab Lot # 500-19261

Package Sealed Yes [✓ No]
Samples Sealed Yes [✓ No]
Received on Ice Yes [✓ No]
Samples Intact [✓ Yes] No
Temperature °C of Cooler
Within Hold Time [✓ Yes] No
Preserv. indicated Yes [✓ No] NA
pH Check ok Yes No [✓ NA]
Res. Cl_2 Check ok Yes No [✓ NA]
Sample Labels and COC Agree [✓ Yes] No COC not present

Sampler Name: Beckie Maddox
Signature:
Project Name: 3S Ash Pond Poz-o-Pac
~~Project Number:~~ PO # 4500037430
Project Location:
Lab PM:
Date Required Hard Copy: ___/___/___ Fax:

Refrg #:
#/ Cont.:
Volume:
Preserv:

Laboratory ID	MS MSD	Client Sample ID	Sampling Date	Sampling Time	Mtx	Grab	Paint Filter	Flash Point - Open Cup	TCLP Metals	TCLP Organics	Total PCBs	EOX	pH	Tot Cyanide	Sulfide (reactive)	Phencl (tot)	Additional Analyses / Remarks
1		3S Ash Pond Boring	6/3/09	3:30pm	SD	X	X	X	X	X	X	X	X	X	X	X	Results Copy Beckie Maddox
																	rmaddox@mwgen.com
																	815-372-4589

RELINQUISHED BY Beckie Maddox	COMPANY MWGen	DATE 6/4/09	TIME 1030	RECEIVED BY	COMPANY	DATE	TIME
RELINQUISHED BY	COMPANY	DATE	TIME	RECEIVED BY	COMPANY TA	DATE 6/4/09	TIME 1105

Matrix Key
WW = Wastewater
W = Water
S = Soil
SL = Sludge
MS = Miscellaneous
OL = Oil
SE = Sediment
SO = Solid
DS = Drum Solid
DL = Drum Liquid
L = Leachate
WI = Wipe

Container Key
1. Plastic
2. VOA Vial
3. Sterile Plastic
4. Amber Glass
5. Widemouth Glass
6. Other

Preservative Key
1. HCl, Cool to 4°
2. H2SO4, Cool to 4°
3. HNO3, Cool to 4°
4. NaOH, Cool to 4°
5. NaOH/Zn Acetate, Cool to 4°
6. Cool to 4°

COMMENTS: if this sample is too thick and you can't break down, please call + we will arrange for a smaller sample.

Date Received 6, 4, 09
Courier: TA Hand Delivered ☒
Bill of Lading:

STL Chicago Chain of Custody: CHI-22-09-231/A-5/99.

Login Sample Receipt Check List

Client: Midwest Generation EME LLC

Job Number: 500-19261-1

Login Number: 19261

List Source: TestAmerica Chicago

Creator: Lunt, Jeff T

List Number: 1

Question	T / F/ NA	Comment
Radioactivity either was not measured or, if measured, is at or below background	True	
The cooler's custody seal, if present, is intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	N/A	
Samples were received on ice.	False	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
There are no discrepancies between the sample IDs on the containers and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter.	N/A	
If necessary, staff have been informed of any short hold time or quick TAT needs	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	

Login Sample Receipt Check List

Client: Midwest Generation EME LLC
Job Number: 500-19261-1

Login Number: 19261
Creator: Daughtry, Beth
List Number: 1
List Source: TestAmerica Savannah
List Creation: 06/09/09 12:34 PM

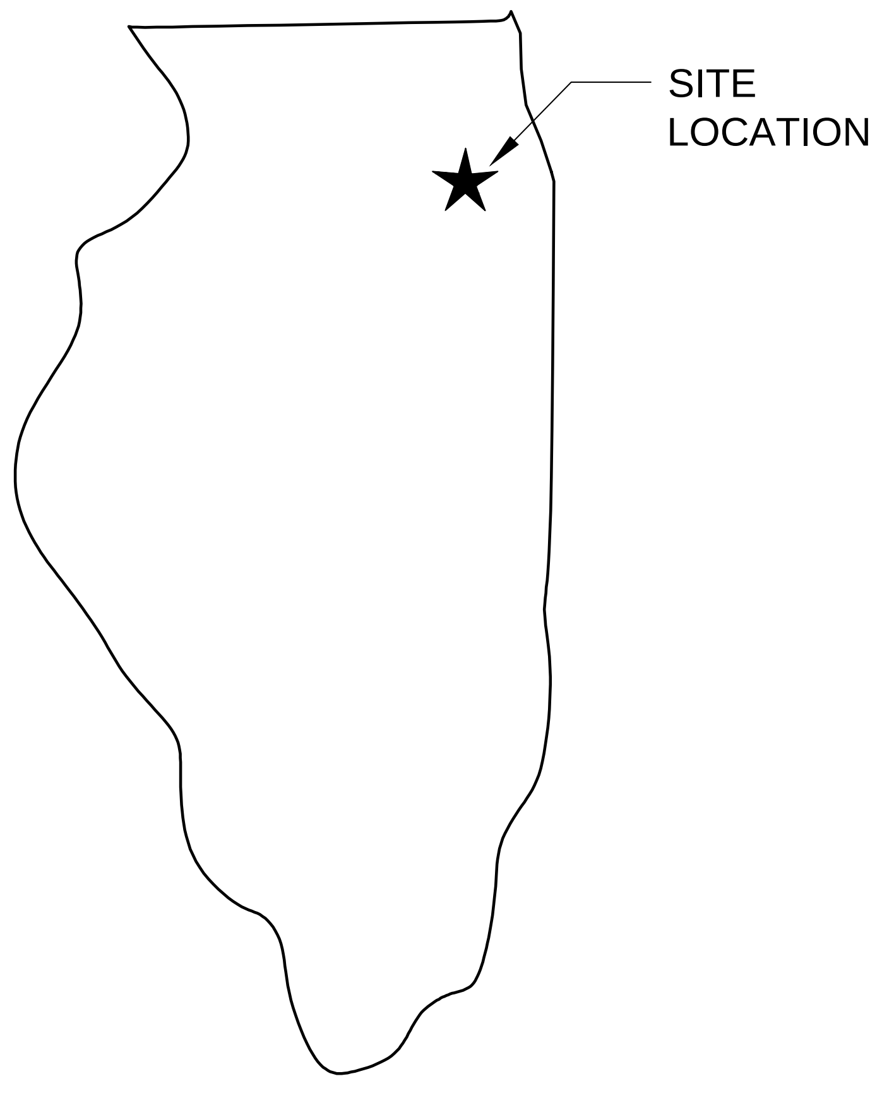
Question	T / F/ NA	Comment
Radioactivity either was not measured or, if measured, is at or below background	N/A	
The cooler's custody seal, if present, is intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
There are no discrepancies between the sample IDs on the containers and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter.	N/A	
If necessary, staff have been informed of any short hold time or quick TAT needs	True	
Multiphasic samples are not present.	N/A	
Samples do not require splitting or compositing.	N/A	

SHEETS

SOUTH ASH POND 2 LINER REPLACEMENT
WILL COUNTY GENERATING STATION
MIDWEST GENERATION
ROMEOVILLE, WILL COUNTY, ILLINOIS

LIST OF DRAWINGS

SHEET NO.	TITLE	DRAWING NO.
TS	TITLE SHEET	D21131TS-01
C010	PRE-CONSTRUCTION SITE CONDITIONS	D21131C010-01
C020	LINER SUBGRADE PREPARATION	D21131C020-01
C030	GEOCELL AND WARNING LAYER PLAN	D21131C030-01
C031	DETAILS AND SECTIONS	D21131C031-01
C032	GEOCELL DETAILS AND SECTIONS	D21131C032-01



ILLINOIS

PREPARED FOR:

MIDWEST GENERATION, LLC
528 E. 135TH STREET
ROMEOVILLE, IL 60446

Apr 19, 2013 11:09am PLOTTED BY: rhopkins SAVED BY: rhopkins
Y:\ACADdata\Projects\21\2113\21131_Will Co\BID_CON\D21131TS-01.dwg TS-01
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XREFS:

APRIL 2013

REVISION:	DATE:	APP'D BY:
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1. ISSUED FOR BID	04/19/13	HMS
0. ISSUED FOR PERMIT	12/20/12	HMS

NATURAL
RESOURCE
TECHNOLOGY

PROJECT NO.
2113.1

DRAWN BY:
RLH 12/19/12

CHECKED BY:
RJB 12/19/12

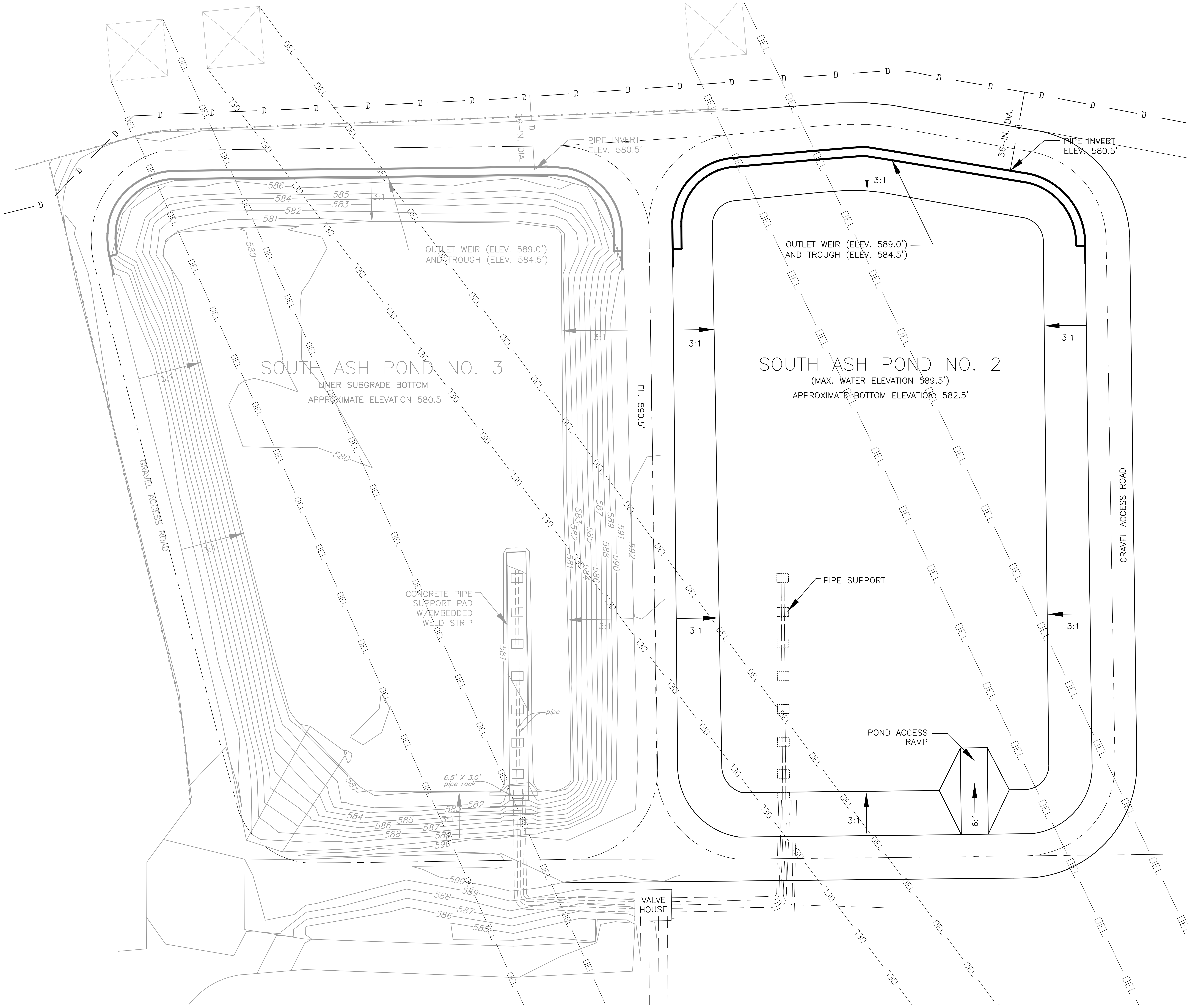
APPROVED BY:
HMS 12/20/12

TITLE SHEET

SOUTH ASH POND 2 LINER REPLACEMENT
WILL COUNTY GENERATING STATION
MIDWEST GENERATION
ROMEOVILLE, WILL COUNTY, ILLINOIS

DRAWING NO: D21131TS-01
REFERENCE: .

SHEET NO.
TS



— — — —	ABOVEGROUND INLET PIPE
—— D ——	UNDERGROUND DISCHARGE PIPING
—— DEL ——	OVERHEAD ELECTRIC LINE

CONTRACTOR NOTES: △
1. CONTRACTOR SHALL NOT DISTURB OPERATIONS OF ASH POND 3 WHEN WORKING ON ASH POND 2.

N

0 15 30 60
SCALE IN FEET
(APPROXIMATE)

SOURCE NOTES:
1. THIS DRAWING WAS DEVELOPED FROM DRAWING NO. 869D1-C11 REV. 7, BY HARZA ENGINEERING COMPANY, CHICAGO, ILLINOIS, DATED AUG. 1979, PROVIDED BY MIDWEST GENERATION.
2. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE. PIPING AND OTHER UTILITY LOCATIONS ARE APPROXIMATE.

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1.	ISSUED FOR BID	04/19/13	HMS
0.	ISSUED FOR PERMIT	12/20/12	HMS
REVISION:		DATE:	APP'D BY:

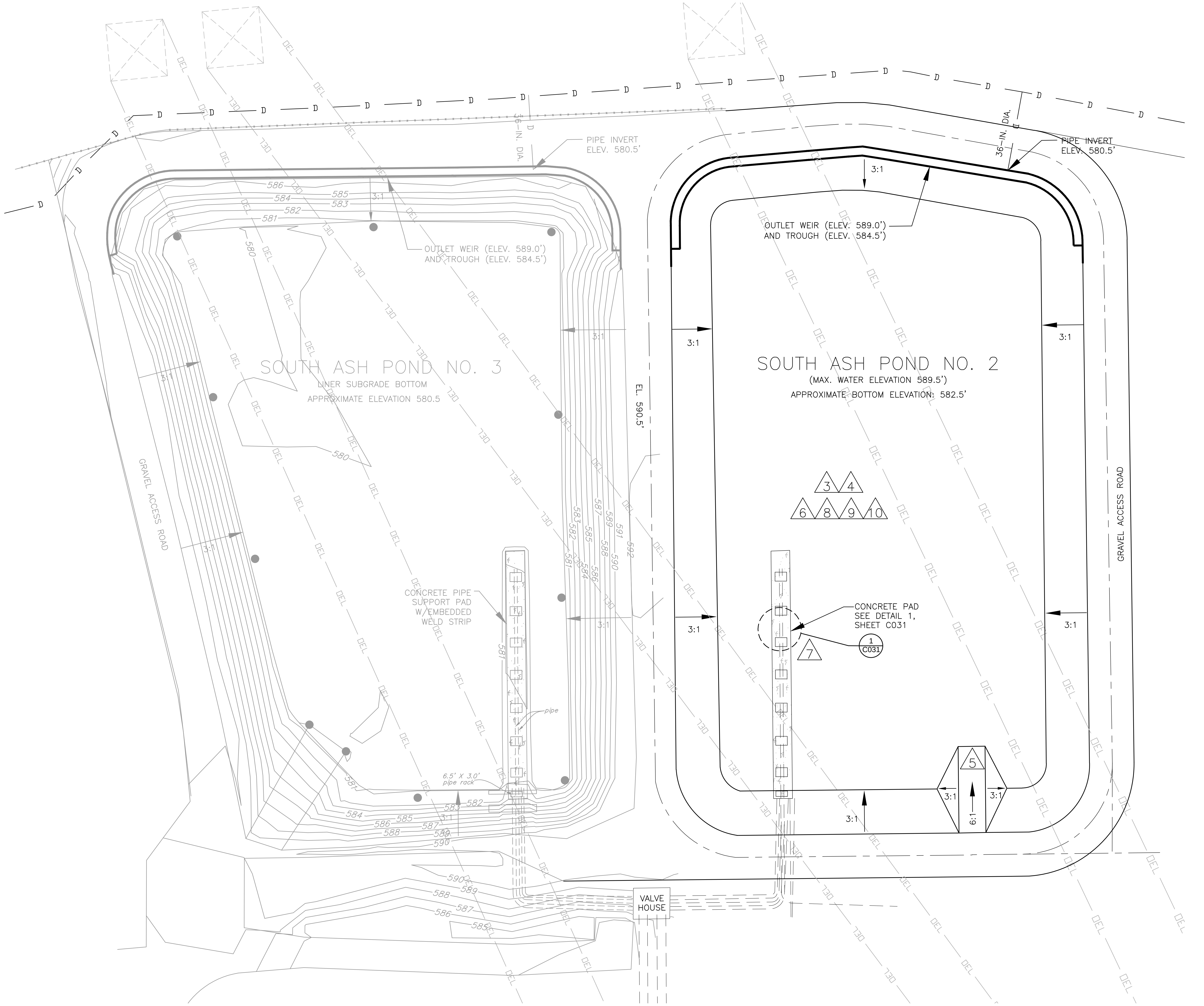
NATURAL
RESOURCE
TECHNOLOGY

PROJECT NO.
2113.1
DRAWN BY:
RLH 12/19/12
CHECKED BY:
RJB 12/19/12
APPROVED BY:
HMS 12/20/12

PRE-CONSTRUCTION SITE CONDITIONS

SOUTH ASH POND 2 LINER REPLACEMENT
WILL COUNTY GENERATING STATION
MIDWEST GENERATION
ROMEOVILLE, WILL COUNTY, ILLINOIS

DRAWING NO: D21131C010-01
REFERENCE: .
SHEET NO.
C010



583	EXISTING CONTOUR
— — —	ABOVEGROUND INLET PIPE
······	EXISTING FENCE
— D —	UNDERGROUND DISCHARGE PIPING
— DEL —	OVERHEAD ELECTRIC LINE
●	MARKER POST LOCATION
▨	CONCRETE

CONTRACTOR NOTES: △

1. CONTRACTOR SHALL STORE ALL GEOSYNTHETICS AND SUBGRADE MATERIALS IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS.
2. CONTRACTOR SHALL STORE AND STAGE EQUIPMENT AT LOCATION APPROVED BY MIDWEST GENERATION.
3. PROTECT ALL CONCRETE AND UTILITY STRUCTURES THROUGHOUT PROJECT DURATION.
4. CONTRACTOR SHALL REMOVE ALL VEGETATION, ROCKS, AND OTHER DEBRIS GREATER THAN 1 INCHE IN SIZE FROM POND SUBGRADE AND DISPOSE OF IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS.
5. CONTRACTOR SHALL CLEAN OFF THE RAMP CONCRETE SURFACE TO THE EXTENT PRACTICAL TO REMOVE ROCKS THAT MAY POSE A HAZARD TO GEOMEMBRANE, AS APPROVED BY GEOMEMBRANE INSTALLER, ENGINEER AND/OR MWG.
6. CONTRACTOR SHALL REMOVE ENTIRE LAYER OF EXISTING POZ-O-PAC LINER FROM THE BASE OF THE ASH POND AND 6 INCHES OF EXISTING FILL MATERIAL BELOW THE POZ-O-PAC, EXCLUDING AREA AROUND PIPE SUPPORTS, AS NEEDED TO ACHIEVE FINAL SUBGRADE ELEVATION 581 FT. LOWER LAYER OF POZ-O-PAC SHALL REMAIN IN PLACE.
7. CONTRACTOR SHALL CONSTRUCT CONCRETE PAD IN ACCORDANCE WITH THE CONTRACT DOCUMENTS (SEE DETAIL 1 ON SHEET C031).
8. CONTRACTOR SHALL PLACE 16 OZ/SY NONWOVEN GEOTEXTILE OVER THE PREPARED SUBGRADE IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS.
9. SUBGRADE SHALL BE APPROVED BY MWG AND/OR ENGINEER PRIOR TO INSTALLATION OF GEOMEMBRANE.
10. CONTRACTOR SHALL PROVIDE MEANS TO PROTECT SUBGRADE FROM EROSION, STORM WATER, AND HEAVY EQUIPMENT TRAFFIC. DAMAGE TO SUBGRADE SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE.

N

0 15 30 60

SCALE IN FEET

(APPROXIMATE)

SOURCE NOTES:

1. THIS DRAWING WAS DEVELOPED FROM DRAWING NO. 869D1-C11 REV. 7, BY HARZA ENGINEERING COMPANY, CHICAGO, ILLINOIS, DATED AUG. 1979, PROVIDED BY MIDWEST GENERATION.
2. ALSO FROM DRAWING NO. 309-1053-T BY RUETTIGER, TONELLI & ASSOCIATES, INC., JOLIET, ILLINOIS, DATED OCTOBER 5, 2009.
3. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE. PIPING AND OTHER UTILITY LOCATIONS ARE APPROXIMATE.

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1.	ISSUED FOR BID	04/19/13	HMS
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REVISION:		DATE:	APP'D BY:

NATURAL
RESOURCE
TECHNOLOGY

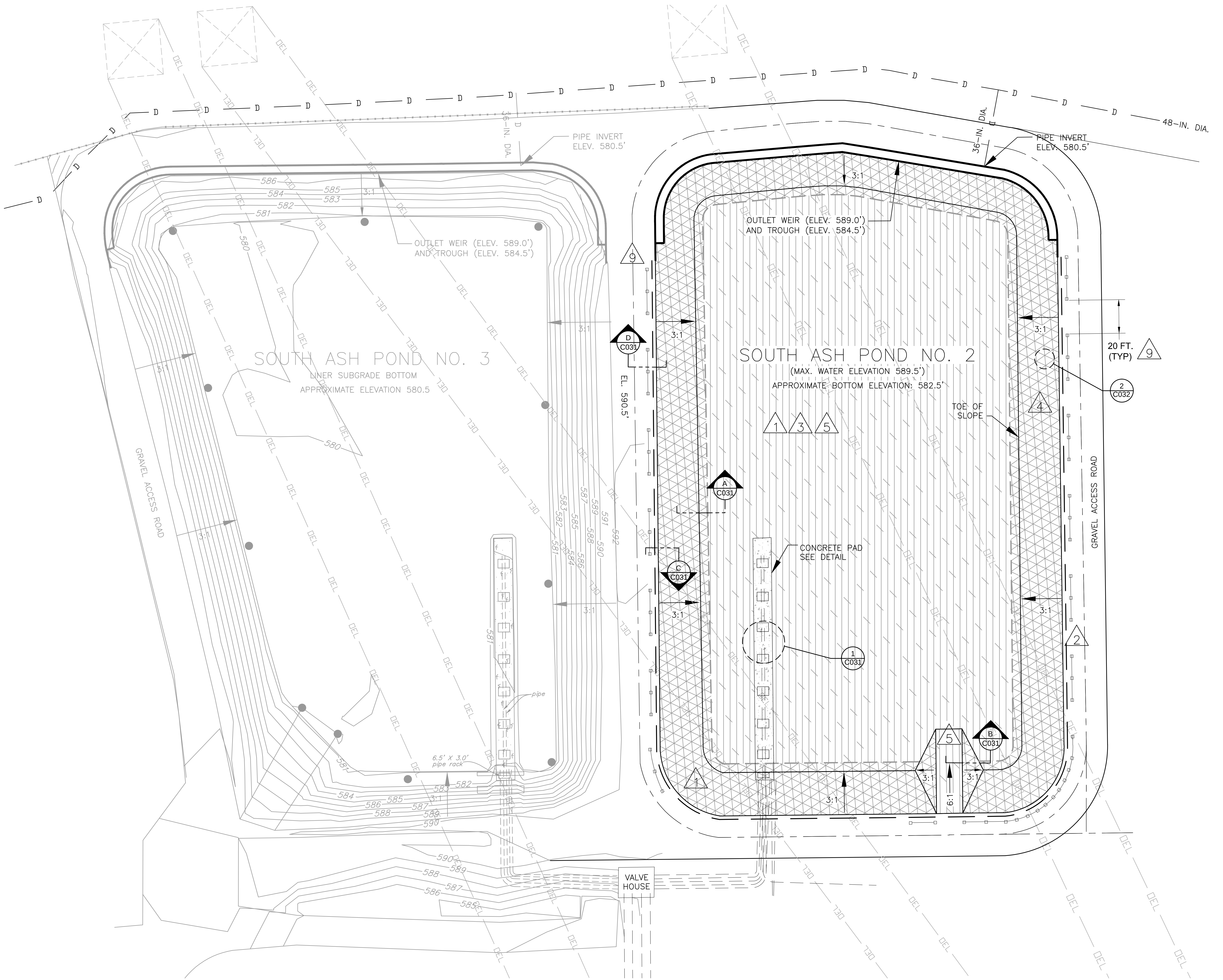
PROJECT NO.
2113.1
DRAWN BY:
RLH 12/19/12
CHECKED BY:
RJB 12/19/12
APPROVED BY:
HMS 12/20/12

LINER SUBGRADE PREPARATION

SOUTH ASH POND 2 LINER REPLACEMENT
WILL COUNTY GENERATING STATION
MIDWEST GENERATION
ROMEOVILLE, WILL COUNTY, ILLINOIS

DRAWING NO: D21131C020-01
REFERENCE: .

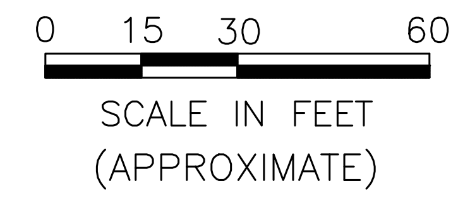
SHEET NO.
C020



— — —	ABOVEGROUND INLET PIPE
— D —	UNDERGROUND DISCHARGE PIPE
— DEL —	OVERHEAD ELECTRIC LINE
— —	ANCHOR TRENCH
—□—□—	GUARD RAIL
●	MARKER POST LOCATION
▨	CONCRETE
▥	WARNING LAYER
▩	GEOCELL

CONTRACTOR NOTES: △

1. CONTRACTOR SHALL INSTALL 60 MIL HDPE, WHITE, TEXTURED GEOMEMBRANE IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS PRIOR TO PLACEMENT OF THE CUSHION AND WARNING LAYERS. CONTRACTOR SHALL PROVIDE AND FOLLOW AN APPROVED GEOMEMBRANE LAYOUT PLAN.
2. GEOMEMBRANE SHALL BE ANCHORED INTO 2.5 FEET DEEP TRENCHES ALONG TOP OF POND BANK, AS SHOWN ON SHEET C031. CONTRACTOR SHALL ADVISE MWG AND/OR ENGINEER IF PROPOSED LOCATION FOR ANCHOR TRENCH IS NOT POSSIBLE.
3. CONTRACTOR SHALL PLACE 16 OZ/SY NONWOVEN GEOTEXTILE OVER THE GEOMEMBRANE FOLLOWING ENGINEER APPROVAL AND PASSING QUALITY CONTROL RESULTS IN ACCORDANCE WITH TECHNICAL SPECIFICATIONS (SEE SHEET C031).
4. GEOCELL SHALL BE INSTALLED ALONG SIDE SLOPES IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS AND MANUFACTURER'S RECOMMENDATIONS (SEE SHEET C032). NO FOOT OR VEHICULAR TRAFFIC IS ALLOWED ON THE GEOCELL PRIOR TO INFILL.
5. CUSHION MATERIAL AND WARNING LAYER MATERIAL SHALL BE PLACED AT THE BASE OF POND IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS (SEE SHEET C031).
6. RESTORE AREAS DISTURBED BY EQUIPMENT AND MATERIAL LAYDOWN.
7. CONTRACTOR SHALL PROVIDE SURVEY DOCUMENTATION OF THE ITEMS LISTED IN THE TECHNICAL SPECIFICATIONS.
8. CONTRACTOR SHALL PERFORM A LEAK LOCATION SURVEY IN ACCORDANCE WITH TECHNICAL SPECIFICATIONS FOLLOWING PLACEMENT OF GEOCELL, CUSHION, AND WARNING LAYERS.
9. CONTRACTOR SHALL INSTALL GUARDRAILS ALONG TOP OF SLOPE EVERY 20 FEET AS SHOWN (SEE DETAIL ON SHEET C031) AND IN ACCORDANCE WITH MANUFACTURER'S REQUIREMENTS/INSTRUCTIONS AS APPROVED BY MWG AND/OR ENGINEER.



SCALE IN FEET
(APPROXIMATE)

SOURCE NOTES:

1. THIS DRAWING WAS DEVELOPED FROM DRAWING NO. 869D1-C11 REV. 7, BY HARZA ENGINEERING COMPANY, CHICAGO, ILLINOIS, DATED AUG. 1979, PROVIDED BY MIDWEST GENERATION.
2. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE. PIPING AND OTHER UTILITY LOCATIONS ARE APPROXIMATE.

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1.	ISSUED FOR BID	05/03/13	HMS
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REVISION:		DATE:	APP'D BY:

NATURAL
RESOURCE
TECHNOLOGY

PROJECT NO.
2113.1

DRAWN BY:
RLH 12/19/12

CHECKED BY:
RJB 12/19/12

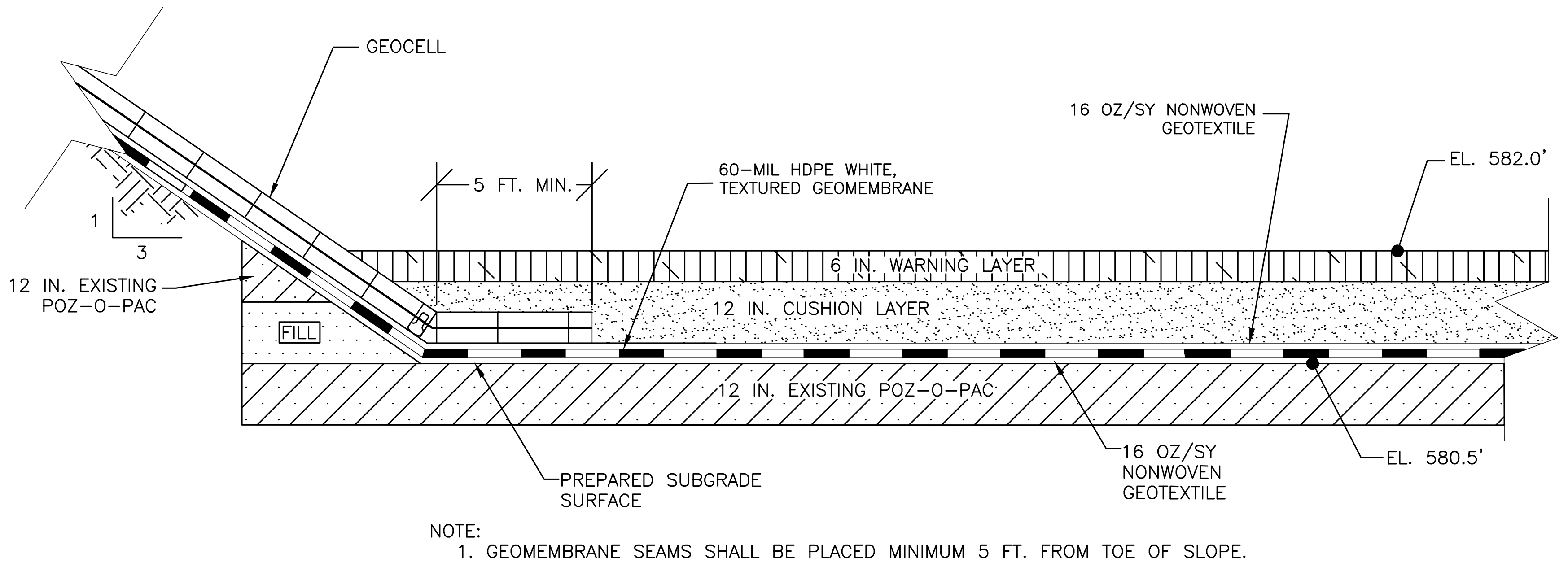
APPROVED BY:
HMS 12/20/12

GEOCELL AND WARNING LAYER PLAN

SOUTH ASH POND 2 LINER REPLACEMENT
WILL COUNTY GENERATING STATION
MIDWEST GENERATION
ROMEOVILLE, WILL COUNTY, ILLINOIS

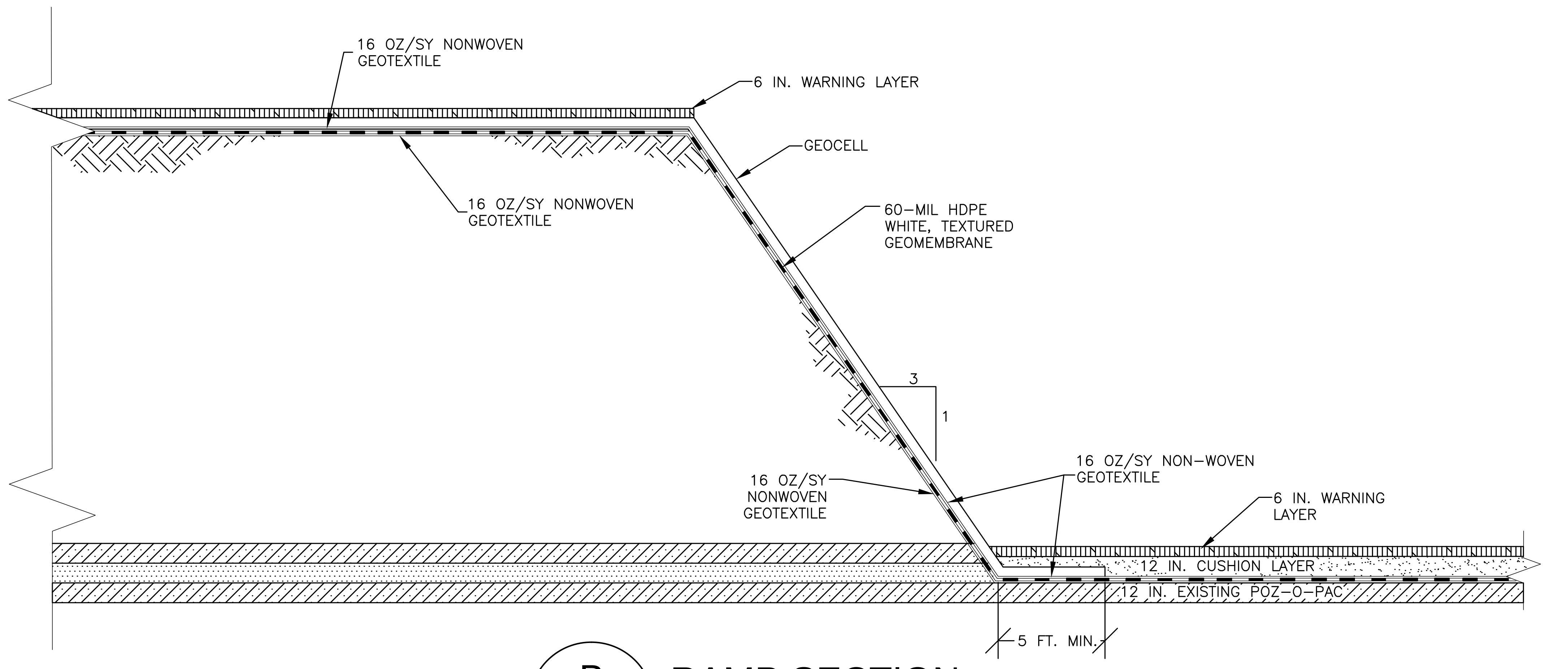
DRAWING NO: D21131C030-01
REFERENCE: .

SHEET NO.
C030

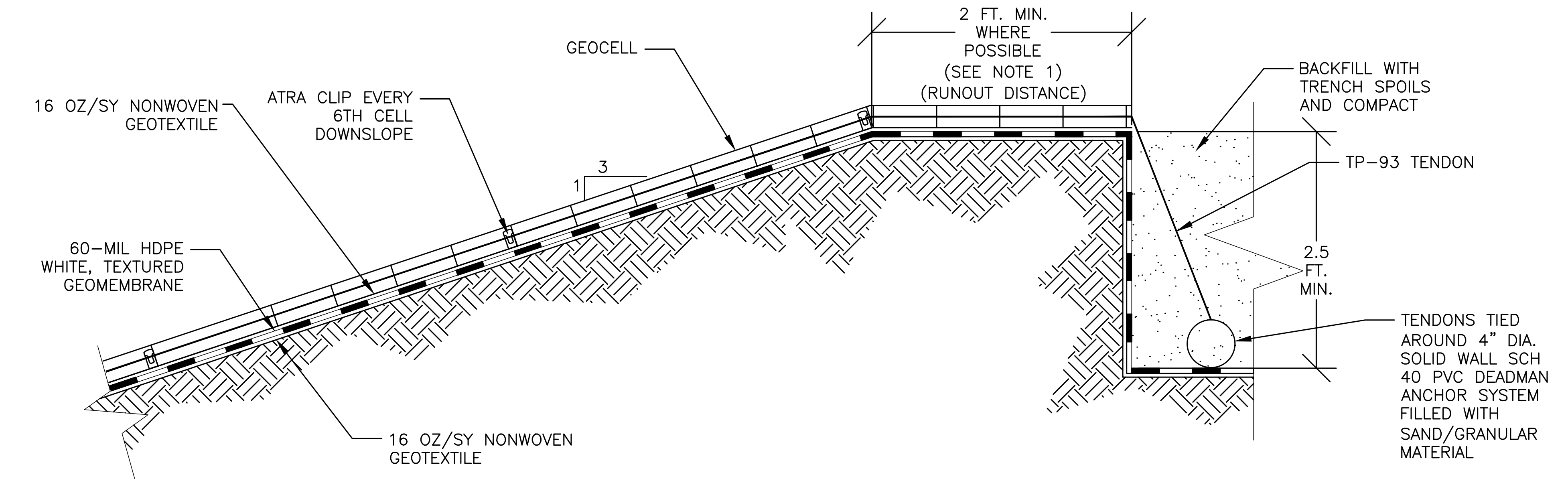


NOTE:
1. GEOMEMBRANE SEAMS SHALL BE PLACED MINIMUM 5 FT. FROM TOE OF SLOPE.

A / C030 SLOPE TRANSITION SECTION
NOT TO SCALE

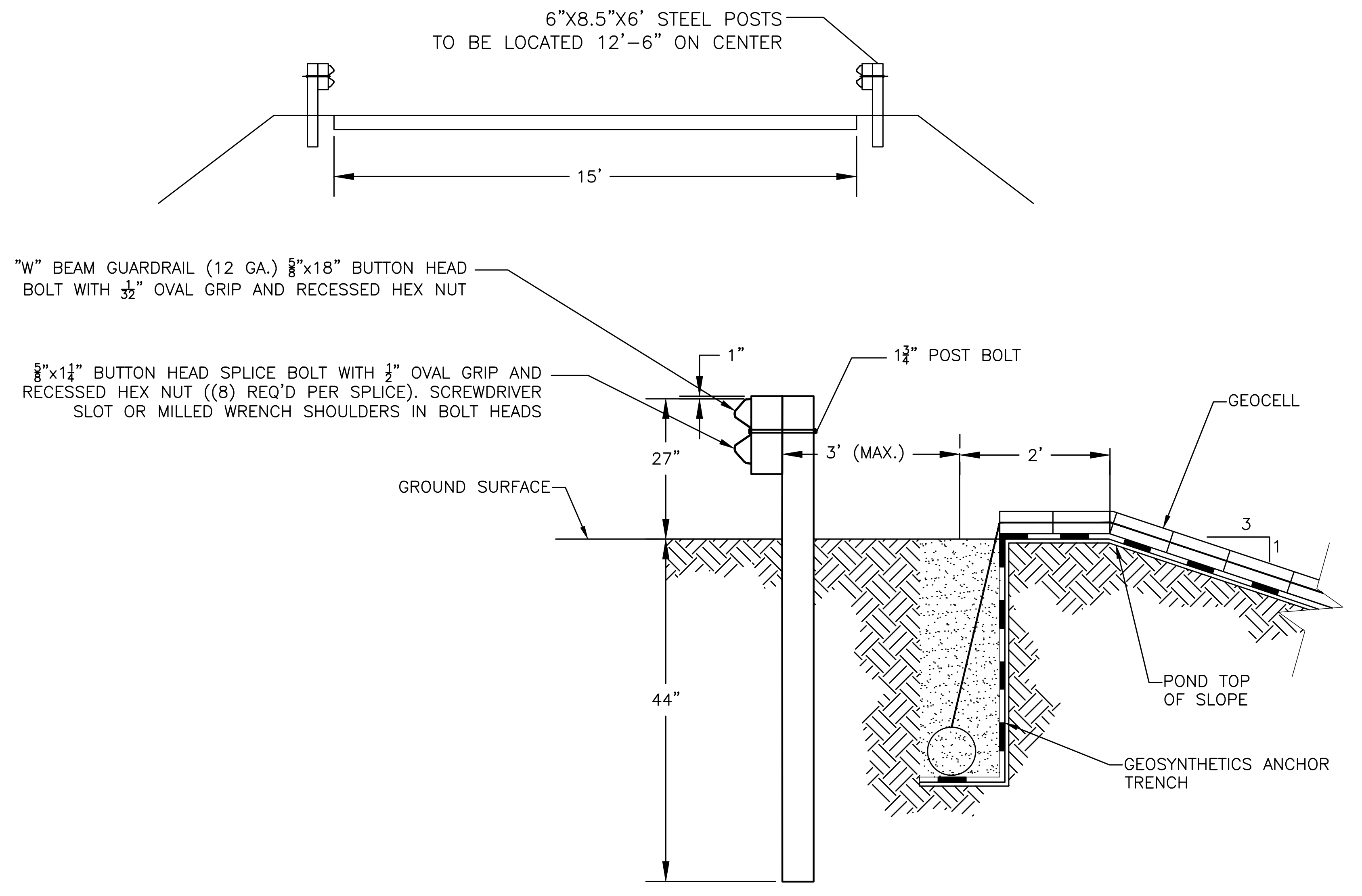


B / C030 RAMP SECTION
NOT TO SCALE

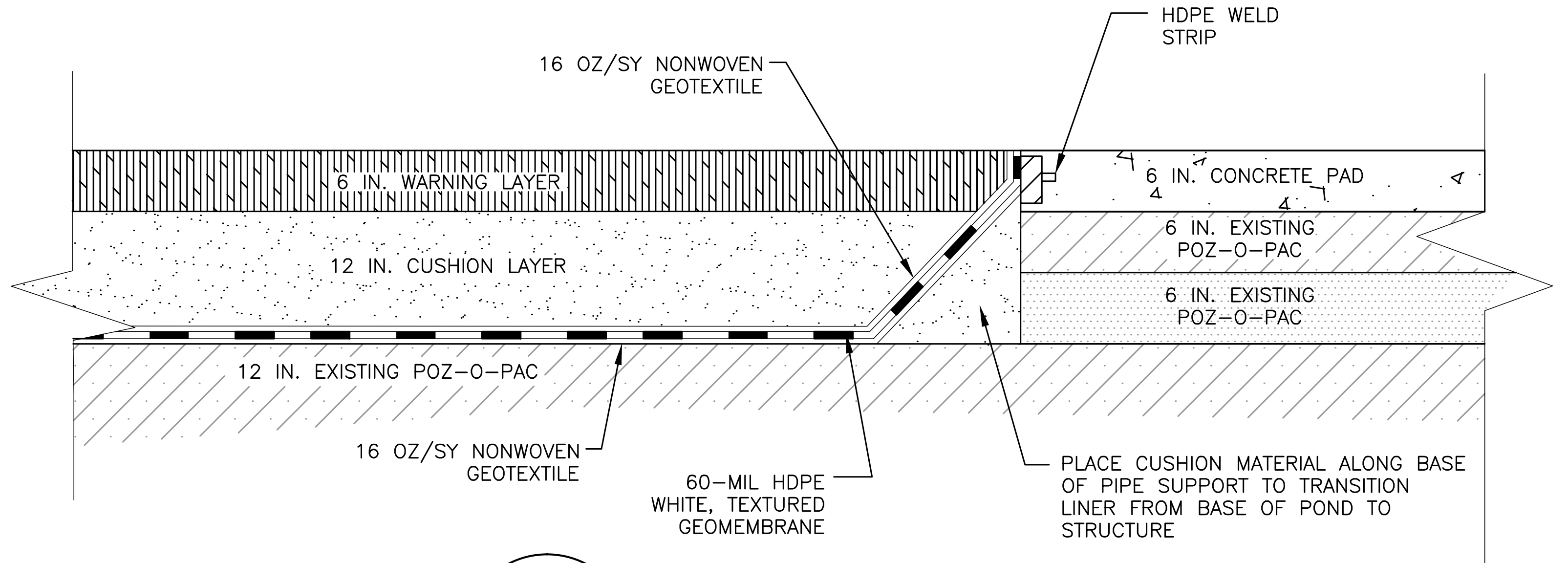


NOTE:
1. GEOCELL HORIZONTAL RUNOUT SHALL BE BACKFILLED WITH CUSHION MATERIAL AFTER LEAK LOCATION SURVEY IS COMPLETED.

C / C030 ANCHOR TRENCH DETAIL
NOT TO SCALE



D / C030 GUARDRAIL DETAIL
NOT TO SCALE



1 / C020 C030 CONCRETE PAD DETAIL
NOT TO SCALE

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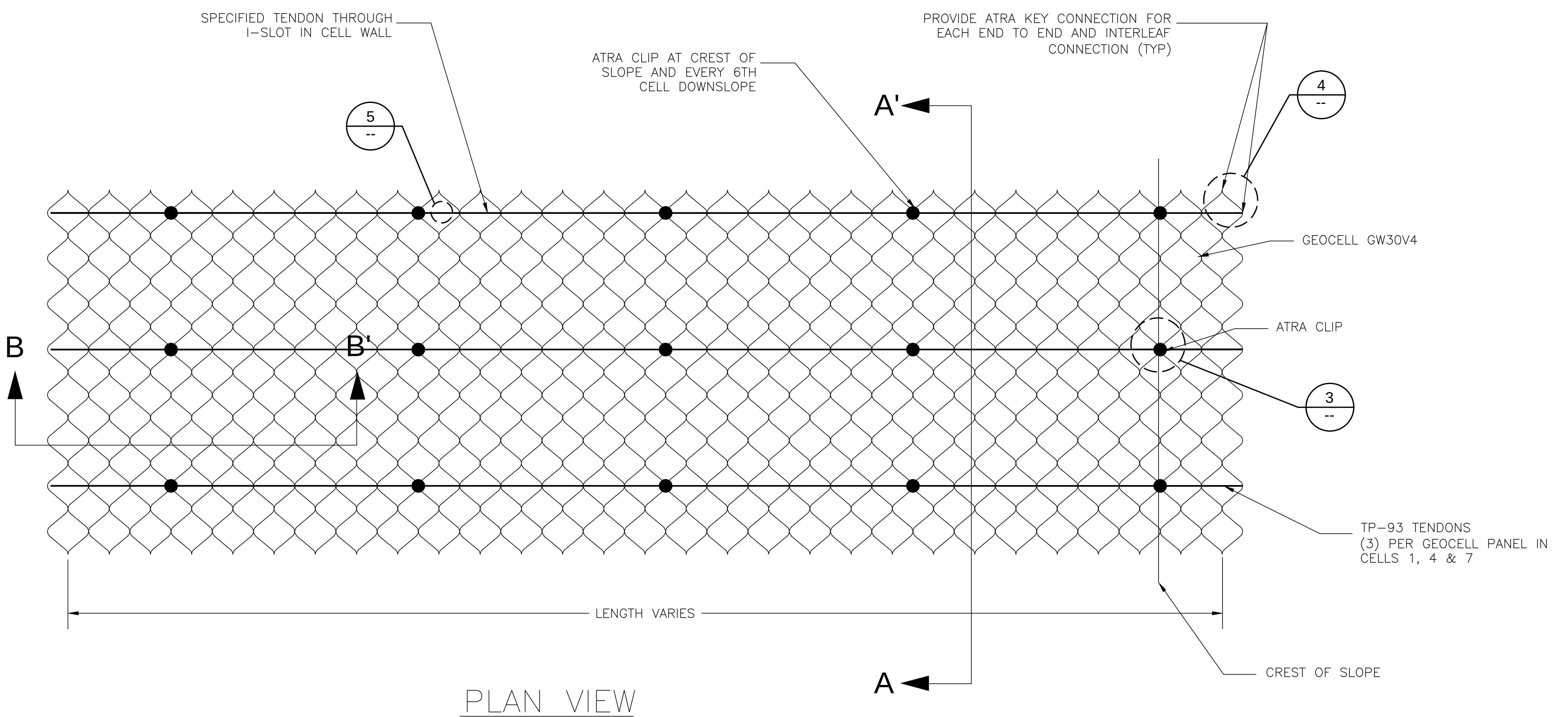
1.	ISSUED FOR BID	05/03/13	HMS
0.	ISSUED FOR PERMIT	12/20/12	HMS
REVISION:		DATE:	APP'D BY:

NATURAL RESOURCE TECHNOLOGY

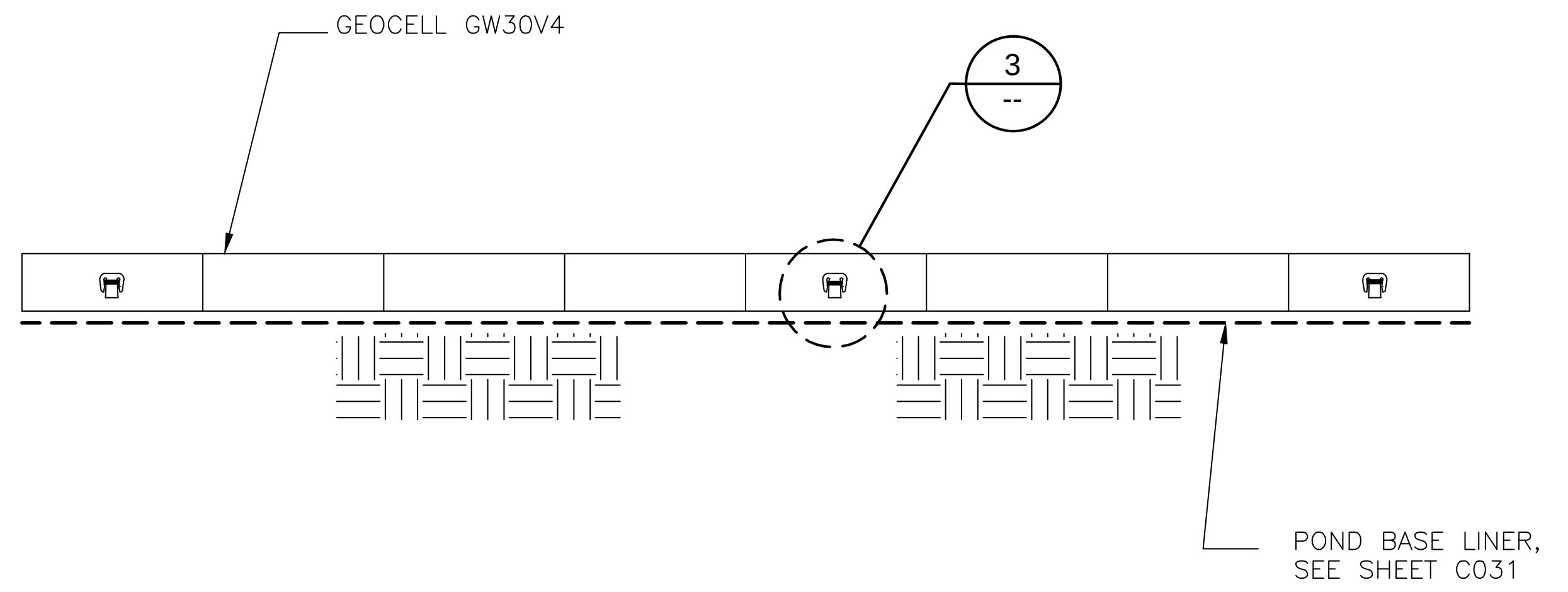
PROJECT NO. 2113.1
DRAWN BY: RLH 12/19/12
CHECKED BY: RJB 12/19/12
APPROVED BY: HMS 12/20/12

DETAILS AND SECTIONS
SOUTH ASH POND 2 LINER REPLACEMENT
WILL COUNTY GENERATING STATION
MIDWEST GENERATION
ROMEOVILLE, WILL COUNTY, ILLINOIS

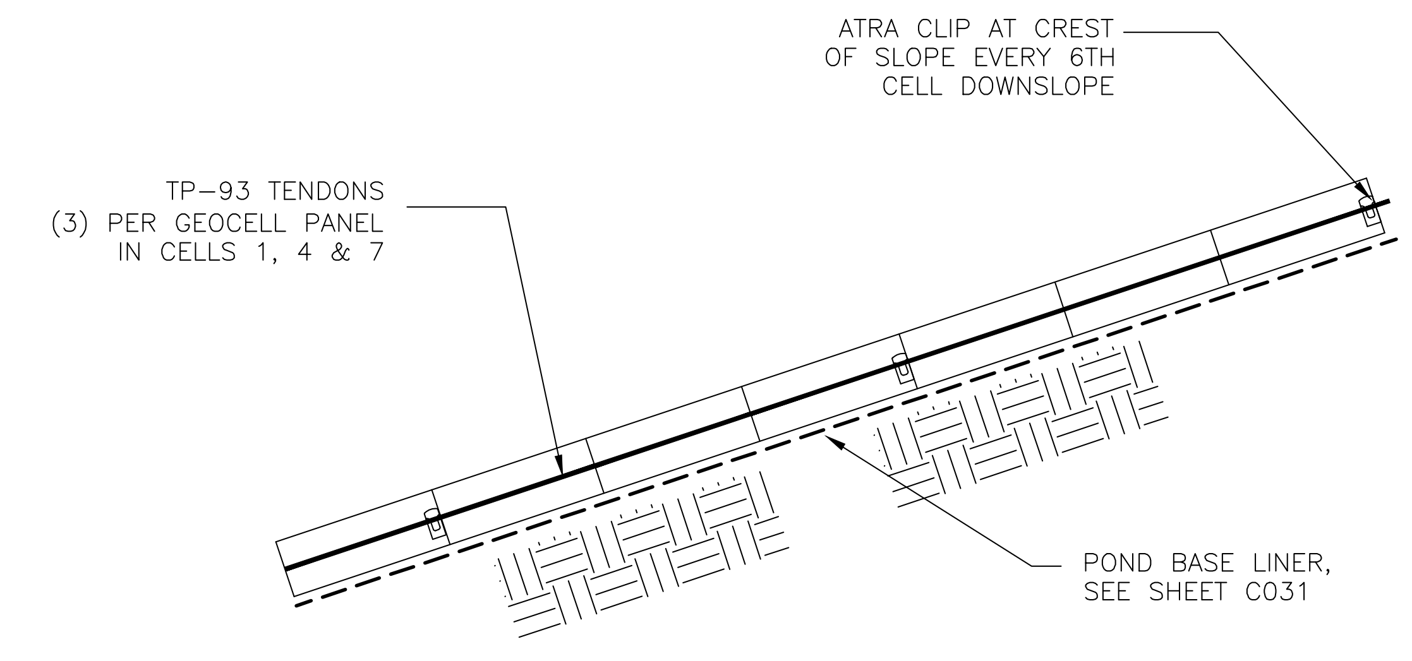
DRAWING NO: D21131C031-01
REFERENCE: .
SHEET NO. C031



PLAN VIEW



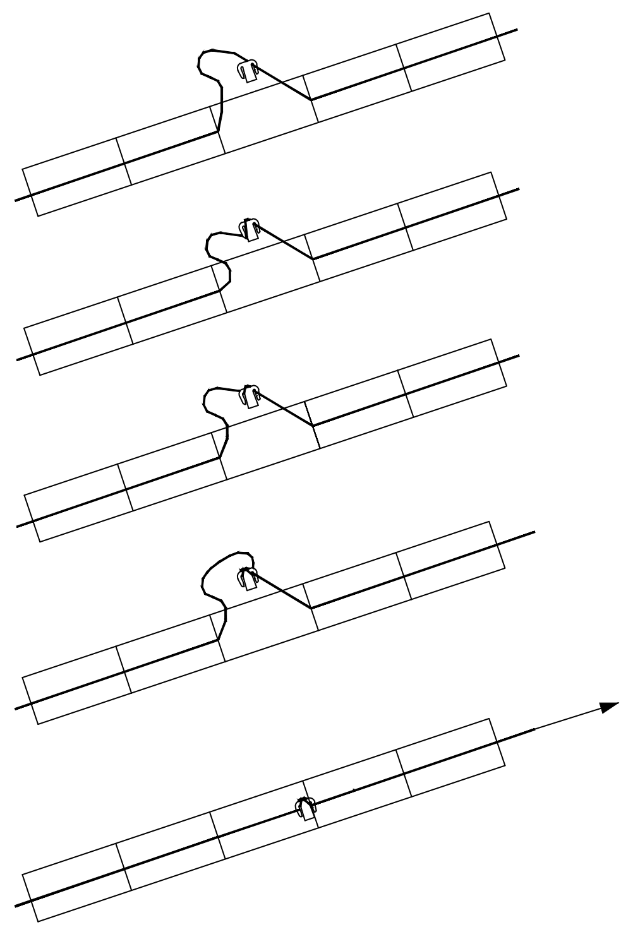
SECTION A–A'



SECTION B–B'

2 / C030 GEOCELL PANEL AND CONNECTIONS DETAIL

NOT TO SCALE



STEPS:

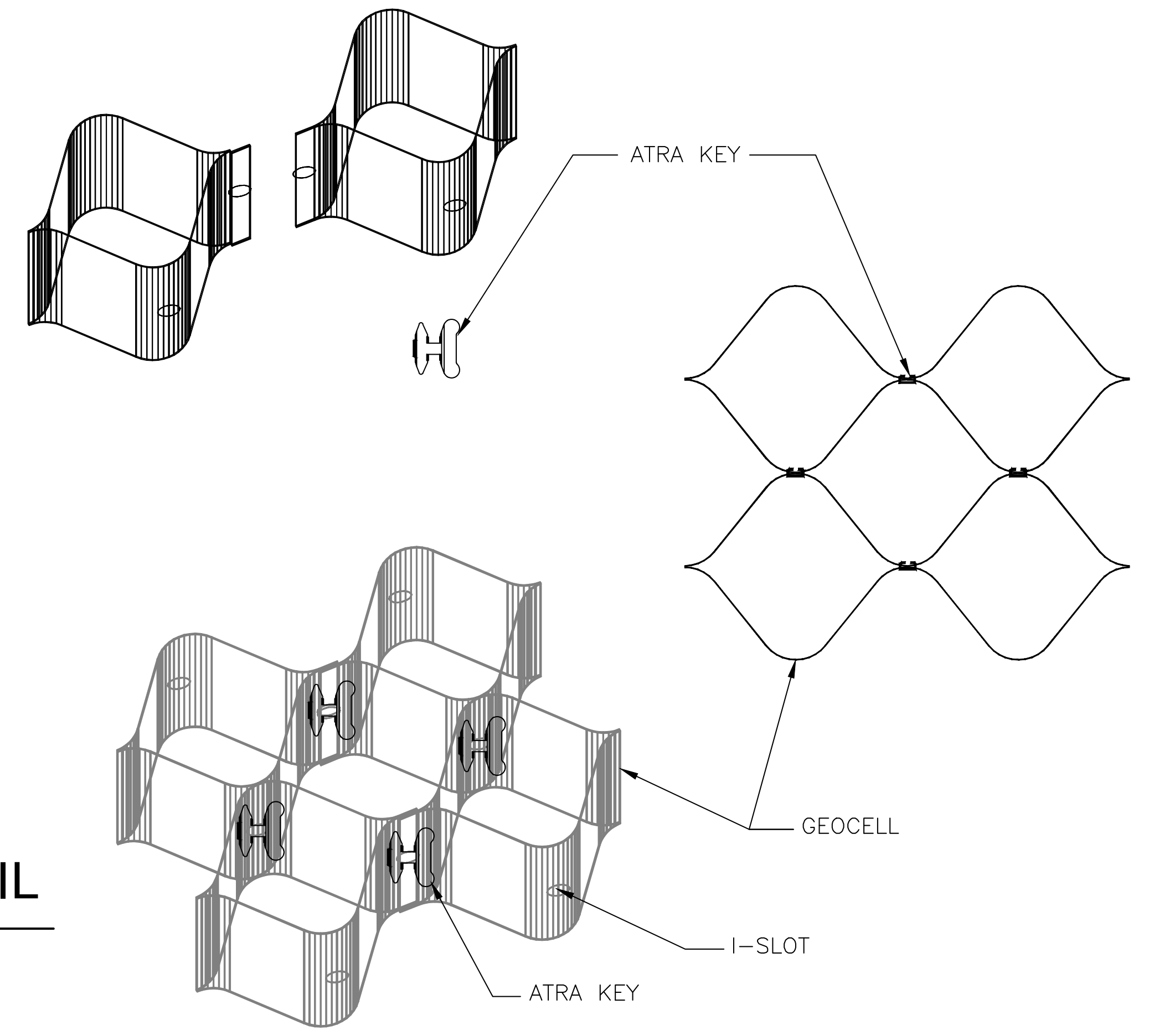
1. PLACE THE TENDON UNDER THE ARM OF THE ATRA CLIP.
2. DIAGONALLY CROSS THE TENDON OVER THE TOP OF THE ATRA CLIP.
3. PLACE THE TENDON UNDER THE OTHER ARM AND PULL TIGHT TO REMOVE SLACK.
4. DIAGONALLY CROSS THE TENDON BACK OVER THE TOP OF THE ATRA CLIP AND PLACE TENDON UNDER THE FIRST ARM.
5. PULL THE TENDON TIGHT TO REMOVE SLACK.
6. ATRA CLIP SHALL BE TIGHT AGAINST THE UPPER CELL WALL AFTER SECURING.
7. PULL TENDON TIGHT AT LOCATION OF NEXT ATRA CLIP.

3 / -- ATRA® CLIP INSTALLATION DETAIL

NOT TO SCALE

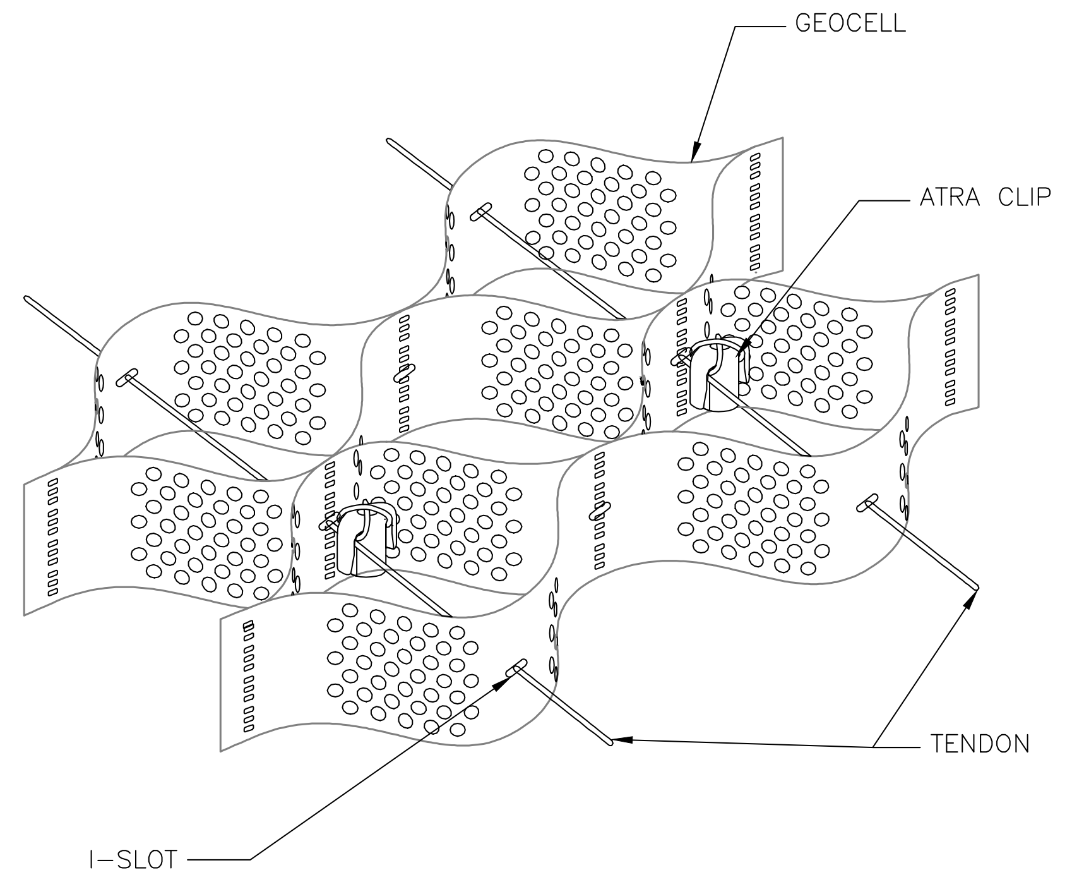
ATRA KEY® CONNECTION DETAILS

GEOCELL CONNECTION NOTES:
1. THE TOP EDGES OF ADJACENT CELL WALLS SHALL BE FLUSH WHEN CONNECTING.
2. ALIGN THE I–SLOTS FOR INTERLEAF AND END TO END CONNECTIONS.
3. THE GEOCELL PANELS SHALL BE CONNECTED WITH ATRA KEYS AT EACH INTERLEAF AND END TO END CONNECTION.



4 / -- GEOCELL SIDE AND END CONNECTION DETAIL

NOT TO SCALE



5 / -- TENDON DETAIL

NOT TO SCALE

6.			
5.			
4.			
3.			
2.			
1.	ISSUED FOR BID	04/19/13	HMS
0.	ISSUED FOR PERMIT	12/20/12	HMS
REVISION:		DATE:	APP'D BY:

NATURAL
RESOURCE
TECHNOLOGY

PROJECT NO.
2113.1
DRAWN BY:
RLH 12/13/12
CHECKED BY:
RJB 12/13/12
APPROVED BY:
HMS 12/20/12

GEOCELL DETAILS AND SECTIONS

SOUTH ASH POND 2 LINER REPLACEMENT
WILL COUNTY GENERATING STATION
MIDWEST GENERATION
ROMEOVILLE, WILL COUNTY, ILLINOIS

DRAWING NO: D21131C032-01
REFERENCE: .

SHEET NO.
C032

Apr 19, 2013 1:53pm PLOTTED BY: rhopkins SAVED BY: rhopkins
Y:\ACADdata\Projects\21\2113\21131_Will Co\BID_CON\D21131C032-01.dwg C032
IMAGES: .\source\1900 scan.tif; Y:\ACADdata\Projects\19\1900\source\1900-rlh.tif; L:\Teams\GeoSystem\Images\Logos-Geosystems\Geosystems Logo (4c).jpg;
XREFS:

ATTACHMENT 2
NARRATIVE DESCRIPTION OF THE FACILITY

1
2
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10
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12

eurofins | Environment Testing America

ANALYTICAL REPORT

Eurofins TestAmerica, Chicago
2417 Bond Street
University Park, IL 60484
Tel: (708)534-5200

Laboratory Job ID: 500-206556-1
Client Project/Site: Will County Ash Sample

For:
KPRG and Associates, Inc.
14665 West Lisbon Road,
Suite 1A
Brookfield, Wisconsin 53005

Attn: Richard Gnat

Diana Mockler

Authorized for release by:
10/20/2021 3:53:29 PM

Diana Mockler, Project Manager I
(219)252-7570
Diana.Mockler@Eurofinset.com

LINKS

Review your project results through Total Access

Have a Question? Ask The Expert

Visit us at:
www.eurofinsus.com/Env

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Table of Contents

Case Narrative

Client: KPRG and Associates, Inc.
Project/Site: Will County Ash Sample

Job ID: 500-206556-1

Job ID: 500-206556-1

Laboratory: Eurofins TestAmerica, Chicago

Narrative

Job Narrative
500-206556-1

Comments

No additional comments.

Receipt

The sample was received on 10/11/2021 1:00 PM. Unless otherwise noted below, the sample arrived in good condition, and where required, properly preserved and on ice. The temperature of the cooler at receipt was 15.5º C.

Metals

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

General Chemistry

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Method Summary

Method	Method Description	Protocol	Laboratory
6010B	Metals (ICP)	SW846	TAL CHI
7471A	Mercury (CVAA)	SW846	TAL CHI
9056A	Anions, Ion Chromatography	SW846	TAL CHI
Moisture	Percent Moisture	EPA	TAL CHI
SM 4500 Cl- E	Chloride, Total	SM	TAL CHI
SM 4500 F C	Fluoride	SM	TAL CHI
300_Prep	Anions, Ion Chromatography, 10% Wt/Vol	MCAWW	TAL CHI
3050B	Preparation, Metals	SW846	TAL CHI
7471A	Preparation, Mercury	SW846	TAL CHI

Protocol References:

EPA = US Environmental Protection Agency

MCAWW = "Methods For Chemical Analysis Of Water And Wastes", EPA-600/4-79-020, March 1983 And Subsequent Revisions.

SM = "Standard Methods For The Examination Of Water And Wastewater"

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL CHI = Eurofins TestAmerica, Chicago, 2417 Bond Street, University Park, IL 60484, TEL (708)534-5200

Sample Summary

Client: KPRG and Associates, Inc.
Project/Site: Will County Ash Sample

Job ID: 500-206556-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
500-206556-1	Pond 2S CCR	Solid	10/11/21 11:30	10/11/21 13:00

1
2
3
4
5
6
7
8
9
10
11
12

Client Sample Results

Client Sample ID: Pond 2S CCR

Date Collected: 10/11/21 11:30
Date Received: 10/11/21 13:00

Lab Sample ID: 500-206556-1

Matrix: Solid

Method: 6010B - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<1.7		1.7		mg/Kg		10/19/21 09:55	10/19/21 20:46	1
Arsenic	**1.3**		0.87		mg/Kg		10/19/21 09:55	10/19/21 20:46	1
Barium	**2200**		4.3		mg/Kg		10/19/21 09:55	10/20/21 13:33	5
Beryllium	**1.4**		0.35		mg/Kg		10/19/21 09:55	10/19/21 20:46	1
Boron	**110**		4.3		mg/Kg		10/19/21 09:55	10/19/21 20:46	1
Cadmium	<0.17		0.17		mg/Kg		10/19/21 09:55	10/19/21 20:46	1
Calcium	**78000**		87		mg/Kg		10/19/21 09:55	10/20/21 13:33	5
Chromium	**7.8**		0.87		mg/Kg		10/19/21 09:55	10/19/21 20:46	1
Cobalt	**8.7**		2.2		mg/Kg		10/19/21 09:55	10/20/21 13:33	5
Lead	**3.9**		0.43		mg/Kg		10/19/21 09:55	10/19/21 20:46	1
Lithium	**20**		0.87		mg/Kg		10/19/21 09:55	10/19/21 20:46	1
Molybdenum	**1.5**		0.87		mg/Kg		10/19/21 09:55	10/19/21 20:46	1
Selenium	<4.3		4.3		mg/Kg		10/19/21 09:55	10/20/21 13:33	5
Thallium	**1.2**		0.87		mg/Kg		10/19/21 09:55	10/19/21 20:46	1

Method: 7471A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.016		0.016		mg/Kg		10/14/21 16:30	10/15/21 09:31	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfate	**110**		9.8		mg/Kg		10/18/21 11:20	10/18/21 21:21	5
Chloride	**41**		19		mg/Kg		10/19/21 10:35	10/19/21 13:34	1
Fluoride	<0.99		0.99		mg/Kg		10/19/21 08:55	10/19/21 15:08	1

Definitions/Glossary

Client: KPRG and Associates, Inc.
Project/Site: Will County Ash Sample

Job ID: 500-206556-1

Qualifiers

General Chemistry

Qualifier	Qualifier Description
4	MS, MSD: The analyte present in the original sample is greater than 4 times the matrix spike concentration; therefore, control limits are not applicable.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

QC Association Summary

Client: KPRG and Associates, Inc.
Project/Site: Will County Ash Sample

Job ID: 500-206556-1

Metals

Prep Batch: 623515

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-206556-1	Pond 2S CCR	Total/NA	Solid	7471A	
MB 500-623515/12-A	Method Blank	Total/NA	Solid	7471A	
LCS 500-623515/13-A	Lab Control Sample	Total/NA	Solid	7471A	

Analysis Batch: 623708

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-206556-1	Pond 2S CCR	Total/NA	Solid	7471A	623515
MB 500-623515/12-A	Method Blank	Total/NA	Solid	7471A	623515
LCS 500-623515/13-A	Lab Control Sample	Total/NA	Solid	7471A	623515

Prep Batch: 624269

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-206556-1	Pond 2S CCR	Total/NA	Solid	3050B	
MB 500-624269/1-A	Method Blank	Total/NA	Solid	3050B	
LCS 500-624269/2-A	Lab Control Sample	Total/NA	Solid	3050B	
LCS 500-624269/2-A ^2	Lab Control Sample	Total/NA	Solid	3050B	

Analysis Batch: 624447

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-206556-1	Pond 2S CCR	Total/NA	Solid	6010B	624269
MB 500-624269/1-A	Method Blank	Total/NA	Solid	6010B	624269
LCS 500-624269/2-A	Lab Control Sample	Total/NA	Solid	6010B	624269

Analysis Batch: 624556

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-206556-1	Pond 2S CCR	Total/NA	Solid	6010B	624269
MB 500-624269/1-A	Method Blank	Total/NA	Solid	6010B	624269
LCS 500-624269/2-A ^2	Lab Control Sample	Total/NA	Solid	6010B	624269

General Chemistry

Analysis Batch: 623031

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-206556-1	Pond 2S CCR	Total/NA	Solid	Moisture	

Prep Batch: 623871

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-206556-1	Pond 2S CCR	Total/NA	Solid	300_Prep	
500-206556-1 MS	Pond 2S CCR	Total/NA	Solid	300_Prep	
500-206556-1 MSD	Pond 2S CCR	Total/NA	Solid	300_Prep	

Analysis Batch: 624089

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-206556-1	Pond 2S CCR	Total/NA	Solid	9056A	623871
500-206556-1 MS	Pond 2S CCR	Total/NA	Solid	9056A	623871
500-206556-1 MSD	Pond 2S CCR	Total/NA	Solid	9056A	623871

Prep Batch: 624255

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-206556-1	Pond 2S CCR	Total/NA	Solid	300_Prep	
MB 500-624255/1-A	Method Blank	Total/NA	Solid	300_Prep	

General Chemistry (Continued)

Prep Batch: 624255 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LCS 500-624255/2-A	Lab Control Sample	Total/NA	Solid	300_Prep	
500-206556-1 MS	Pond 2S CCR	Total/NA	Solid	300_Prep	
500-206556-1 MSD	Pond 2S CCR	Total/NA	Solid	300_Prep	

Prep Batch: 624276

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-206556-1	Pond 2S CCR	Total/NA	Solid	300_Prep	
MB 500-624276/1-A	Method Blank	Total/NA	Solid	300_Prep	
LCS 500-624276/2-A	Lab Control Sample	Total/NA	Solid	300_Prep	
500-206556-1 MS	Pond 2S CCR	Total/NA	Solid	300_Prep	
500-206556-1 MSD	Pond 2S CCR	Total/NA	Solid	300_Prep	

Analysis Batch: 624306

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-206556-1	Pond 2S CCR	Total/NA	Solid	SM 4500 Cl- E	624276
MB 500-624276/1-A	Method Blank	Total/NA	Solid	SM 4500 Cl- E	624276
LCS 500-624276/2-A	Lab Control Sample	Total/NA	Solid	SM 4500 Cl- E	624276
500-206556-1 MS	Pond 2S CCR	Total/NA	Solid	SM 4500 Cl- E	624276
500-206556-1 MSD	Pond 2S CCR	Total/NA	Solid	SM 4500 Cl- E	624276

Analysis Batch: 624342

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-206556-1	Pond 2S CCR	Total/NA	Solid	SM 4500 F C	624255
MB 500-624255/1-A	Method Blank	Total/NA	Solid	SM 4500 F C	624255
LCS 500-624255/2-A	Lab Control Sample	Total/NA	Solid	SM 4500 F C	624255
500-206556-1 MS	Pond 2S CCR	Total/NA	Solid	SM 4500 F C	624255
500-206556-1 MSD	Pond 2S CCR	Total/NA	Solid	SM 4500 F C	624255

QC Sample Results

Client: KPRG and Associates, Inc.
Project/Site: Will County Ash Sample

Job ID: 500-206556-1

Method: 6010B - Metals (ICP)

Lab Sample ID: MB 500-624269/1-A
Matrix: Solid
Analysis Batch: 624447

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 624269

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<2.0		2.0		mg/Kg		10/19/21 09:55	10/19/21 19:42	1
Arsenic	<1.0		1.0		mg/Kg		10/19/21 09:55	10/19/21 19:42	1
Barium	<1.0		1.0		mg/Kg		10/19/21 09:55	10/19/21 19:42	1
Boron	<5.0		5.0		mg/Kg		10/19/21 09:55	10/19/21 19:42	1
Cadmium	<0.20		0.20		mg/Kg		10/19/21 09:55	10/19/21 19:42	1
Chromium	<1.0		1.0		mg/Kg		10/19/21 09:55	10/19/21 19:42	1
Lead	<0.50		0.50		mg/Kg		10/19/21 09:55	10/19/21 19:42	1
Lithium	<1.0		1.0		mg/Kg		10/19/21 09:55	10/19/21 19:42	1
Molybdenum	<1.0		1.0		mg/Kg		10/19/21 09:55	10/19/21 19:42	1
Thallium	<1.0		1.0		mg/Kg		10/19/21 09:55	10/19/21 19:42	1

Lab Sample ID: MB 500-624269/1-A
Matrix: Solid
Analysis Batch: 624556

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 624269

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	<1.0		1.0		mg/Kg		10/19/21 09:55	10/20/21 13:23	1
Calcium	<20		20		mg/Kg		10/19/21 09:55	10/20/21 13:23	1
Cobalt	<0.50		0.50		mg/Kg		10/19/21 09:55	10/20/21 13:23	1
Selenium	<1.0		1.0		mg/Kg		10/19/21 09:55	10/20/21 13:23	1

Lab Sample ID: LCS 500-624269/2-A
Matrix: Solid
Analysis Batch: 624447

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 624269

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Antimony	50.0	44.6		mg/Kg		89	80 - 120
Arsenic	10.0	8.65		mg/Kg		87	80 - 120
Barium	200	191		mg/Kg		95	80 - 120
Boron	100	81.6		mg/Kg		82	80 - 120
Cadmium	5.00	4.43		mg/Kg		89	80 - 120
Chromium	20.0	19.0		mg/Kg		95	80 - 120
Lead	10.0	9.00		mg/Kg		90	80 - 120
Lithium	50.0	49.3		mg/Kg		99	80 - 120
Molybdenum	100	98.1		mg/Kg		98	80 - 120
Thallium	10.0	8.76		mg/Kg		88	80 - 120

Lab Sample ID: LCS 500-624269/2-A ^2
Matrix: Solid
Analysis Batch: 624556

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 624269

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Barium	200	194		mg/Kg		97	80 - 120
Calcium	1000	930		mg/Kg		93	80 - 120
Cobalt	50.0	46.1		mg/Kg		92	80 - 120
Selenium	10.0	8.16		mg/Kg		82	80 - 120

QC Sample Results

Client: KPRG and Associates, Inc.
Project/Site: Will County Ash Sample
Job ID: 500-206556-1

Method: 7471A - Mercury (CVAA)

Lab Sample ID: MB 500-623515/12-A
Matrix: Solid
Analysis Batch: 623708
Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 623515

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.017		0.017		mg/Kg		10/14/21 16:30	10/15/21 08:30	1

Lab Sample ID: LCS 500-623515/13-A
Matrix: Solid
Analysis Batch: 623708
Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 623515

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Mercury			0.167	0.151		mg/Kg		91	80 - 120		

Method: 9056A - Anions, Ion Chromatography

Lab Sample ID: 500-206556-1 MS
Matrix: Solid
Analysis Batch: 624089
Client Sample ID: Pond 2S CCR
Prep Type: Total/NA
Prep Batch: 623871

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits		
Sulfate	110		24.5	198	4	mg/Kg		349	75 - 125		

Lab Sample ID: 500-206556-1 MSD
Matrix: Solid
Analysis Batch: 624089
Client Sample ID: Pond 2S CCR
Prep Type: Total/NA
Prep Batch: 623871

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Sulfate	110		24.6	192	4	mg/Kg		321	75 - 125	3	20

Method: SM 4500 Cl- E - Chloride, Total

Lab Sample ID: MB 500-624276/1-A
Matrix: Solid
Analysis Batch: 624306
Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 624276

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	<20		20		mg/Kg		10/19/21 10:35	10/19/21 13:34	1

Lab Sample ID: LCS 500-624276/2-A
Matrix: Solid
Analysis Batch: 624306
Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 624276

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Chloride			200	197		mg/Kg		98	85 - 115		

Lab Sample ID: 500-206556-1 MS
Matrix: Solid
Analysis Batch: 624306
Client Sample ID: Pond 2S CCR
Prep Type: Total/NA
Prep Batch: 624276

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits		
Chloride	41		193	226		mg/Kg		96	75 - 125		

Method: SM 4500 Cl- E - Chloride, Total (Continued)

Lab Sample ID: 500-206556-1 MSD
Matrix: Solid
Analysis Batch: 624306

Client Sample ID: Pond 2S CCR
Prep Type: Total/NA
Prep Batch: 624276

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	41		193	225		mg/Kg		95	75 - 125	0	20

Method: SM 4500 F C - Fluoride

Lab Sample ID: MB 500-624255/1-A
Matrix: Solid
Analysis Batch: 624342

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 624255

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	<1.0		1.0		mg/Kg		10/19/21 08:55	10/19/21 15:00	1

Lab Sample ID: LCS 500-624255/2-A
Matrix: Solid
Analysis Batch: 624342

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 624255

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Fluoride	100	93.7		mg/Kg		94	80 - 120

Lab Sample ID: 500-206556-1 MS
Matrix: Solid
Analysis Batch: 624342

Client Sample ID: Pond 2S CCR
Prep Type: Total/NA
Prep Batch: 624255

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Fluoride	<0.99		49.5	40.7		mg/Kg		81	75 - 125

Lab Sample ID: 500-206556-1 MSD
Matrix: Solid
Analysis Batch: 624342

Client Sample ID: Pond 2S CCR
Prep Type: Total/NA
Prep Batch: 624255

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Fluoride	<0.99		49.6	39.9		mg/Kg		79	75 - 125	2	20

Eurofins TestAmerica, Chicago
2417 Bond Street
University Park IL 60484
Phone 708-534-5200 Fax 708-534-5211

Chain of Custody Record

eurofins

Client Information	Sampler: M. Ress	Lab PM Mockler Diana J	Carrier Tracking No(s)	COC No 500-95707-42336 1
Client Contact: Cory Higgins	Phone 630.602.7240	E-Mail Diana Mockler@Eurofinset com	State of Origin	Page Page 1 of 1
Company: KPRG and Associates Inc	PWSID	**Analysis Requested**		Job #: 500-206556

Address
414 Plaza Drive Suite 106
City:
Westmont
State Zip
IL 60559
Phone
779-279-2321(Tel)
Email
coryh@KPRGinc com
Project Name
Ash Sample
Site
Illinois

500-206556 COC

Due Date Requested
TAT Requested (days):
Compliance Project: Δ Yes Δ No
PO #
4502041043
WO #
Project #:
50011609
SSOW#

Preservation Codes

A	HCL	M	Hexane
B	NaOH	N	None
C	Zn Acetate	O	AsNaO2
D	Nitric Acid	P	Na2O4S
E	NaHSO4	Q	Na2SO3
F	MeOH	R	Na2S2O3
G	Amchlor	S	H2SO4
H	Ascorbic Acid	T	TSP Dodecahydrate
I	Ice	U	Acetone
J	DI Water	V	MCAA
K	EDTA	W	pH 4-5
L	EDA	Z	other (specify)

Other

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water S=solid O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	903.0 904.0	Ra226Ra228_GFPC - Combined Rad 226/228	4500_F_C 6010B 7471A, 9056A, Moisture SM4500_Cl_E	Total Number of containers	Special Instructions/Note
			Preservation Code		X	X	N	N	N	X	
1-Pond 2S CCR	10/11/21	11:30	C	Solid			X	X	X		• See attached list
2-Pond 2S CCR	↓	11:35	C	↓			↓	↓	↓		
3-Pond 2S CCR		11:40	C								
											• CCR appendix 3&4
											• Rush turn-around
											• Contact Josh Davenport w/ questions 262-781-0475

Possible Hazard Identification
☐ Non Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For ________ Months

Deliverable Requested I II III IV Other (specify)

Special Instructions/QC Requirements ~~Rush turn-around~~

Empty Kit Relinquished by	Date	Time	Method of Shipment:
Relinquished by: Michael Ress	Date/Time 10/11/21 13:00	Company KPRG	Received by:	Date/Time 10/11/21 @ 1300	Company ETA
Relinquished by:	Date/Time	Company	Received by:	Date/Time	Company
Relinquished by:	Date/Time	Company	Received by:	Date/Time	Company

Custody Seals Intact: Δ Yes Δ No
Custody Seal No
Cooler Temperature(s) °C and Other Remarks 1.5 5

Ver 06.08 20

Table 1 Ash Parameter List

Parameter
Antimony
Arsenic
Barium
Beryllium
Boron
Cadmium
Chloride
Chromium
Cobalt
Combined Radium 226 + 228 (pCi/L)
Fluoride
Lead
Lithium
Mercury
Molybdenum
pH (standard units)
Selenium
Sulfate
Thallium
Calcium

1 2 3 4 5 6 7 8 9 10 11 12

Login Sample Receipt Checklist

Client: KPRG and Associates, Inc.

Job Number: 500-206556-1

Login Number: 206556
List Number: 1
Creator: Scott, Sherri L

List Source: Eurofins TestAmerica, Chicago

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	Received same day of collection; chilling process has begun.
Cooler Temperature is recorded.	True	15.5
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Lab Chronicle

Client Sample ID: Pond 2S CCR

Lab Sample ID: 500-206556-1

Date Collected: 10/11/21 11:30

Matrix: Solid

Date Received: 10/11/21 13:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			624269	10/19/21 09:55	BDE	TAL CHI
Total/NA	Analysis	6010B		1	624447	10/19/21 20:46	DAJ	TAL CHI
Total/NA	Prep	3050B			624269	10/19/21 09:55	BDE	TAL CHI
Total/NA	Analysis	6010B		5	624556	10/20/21 13:33	JJB	TAL CHI
Total/NA	Prep	7471A			623515	10/14/21 16:30	MJG	TAL CHI
Total/NA	Analysis	7471A		1	623708	10/15/21 09:31	MJG	TAL CHI
Total/NA	Prep	300_Prep			623871	10/18/21 11:20	EAT	TAL CHI
Total/NA	Analysis	9056A		5	624089	10/18/21 21:21	EAT	TAL CHI
Total/NA	Analysis	Moisture		1	623031	10/12/21 09:09	LWN	TAL CHI
Total/NA	Prep	300_Prep			624276	10/19/21 10:35	RES	TAL CHI
Total/NA	Analysis	SM 4500 Cl- E		1	624306	10/19/21 13:34	RES	TAL CHI
Total/NA	Prep	300_Prep			624255	10/19/21 08:55	EAT	TAL CHI
Total/NA	Analysis	SM 4500 F C		1	624342	10/19/21 15:08	EAT	TAL CHI

Laboratory References:

TAL CHI = Eurofins TestAmerica, Chicago, 2417 Bond Street, University Park, IL 60484, TEL (708)534-5200 eurofins

Environment Testing
America

ANALYTICAL REPORT

Eurofins TestAmerica, Chicago
2417 Bond Street
University Park, IL 60484
Tel: (708)534-5200

Laboratory Job ID: 500-206556-2
Client Project/Site: Will County Ash Sample

For:
KPRG and Associates, Inc.
14665 West Lisbon Road,
Suite 1A
Brookfield, Wisconsin 53005

Attn: Richard Gnat

Diana Mockler

Authorized for release by:
11/24/2021 8:38:58 AM

Diana Mockler, Project Manager I
(219)252-7570
Diana.Mockler@Eurofinset.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Table of Contents

Job ID: 500-206556-2

Laboratory: Eurofins TestAmerica, Chicago

Narrative

Job Narrative
500-206556-2

Comments
No additional comments.

Receipt
The sample was received on 10/11/2021 1:00 PM. Unless otherwise noted below, the sample arrived in good condition, and where required, properly preserved and on ice. The temperature of the cooler at receipt was 15.5º C.

RAD
Method 903.0: Radium 226 batch 532819
Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative. Radiochemistry sample results are reported with the count date/time applied as the Activity Reference Date.

Pond 2S CCR (500-206556-1), (LCS 160-532819/1-A), (MB 160-532819/4-A) and (500-206556-B-1-B DU)

Method DPS-0: The sample results for Pond 2S CCR (500-206556-1) and (500-206556-B-1 DU) are based upon sample as received (i.e. wet weight).

Method DPS-0:

Method DPS-21: The sample results for Pond 2S CCR (500-206556-1) and (500-206556-B-1 DU) are based upon sample as received (i.e. wet weight).

Method DPS-21:

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Method Summary

Method	Method Description	Protocol	Laboratory
903.0	Radium-226 (GFPC)	EPA	TAL SL
904.0	Radium-228 (GFPC)	EPA	TAL SL
Ra226_Ra228	Combined Radium-226 and Radium-228	TAL-STL	TAL SL
DPS-0	Preparation, Digestion/ Precipitate	None	TAL SL
DPS-21	Preparation, Digestion/Precipitate Separation (21-Day In-Growth)	None	TAL SL

Protocol References:

EPA = US Environmental Protection Agency

None = None

TAL-STL = TestAmerica Laboratories, St. Louis, Facility Standard Operating Procedure.

Laboratory References:

TAL SL = Eurofins TestAmerica, St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Sample Summary

Client: KPRG and Associates, Inc.
Project/Site: Will County Ash Sample

Job ID: 500-206556-2

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
500-206556-1	Pond 2S CCR	Solid	10/11/21 11:30	10/11/21 13:00

1
2
3
4
5
6
7
8
9
10
11
12
13

Client Sample ID: Pond 2S CCR

Date Collected: 10/11/21 11:30
Date Received: 10/11/21 13:00

Lab Sample ID: 500-206556-1

Matrix: Solid

Method: 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	**0.847**		0.145	0.164	1.00	0.0956	pCi/g	10/20/21 11:24	11/17/21 10:57	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*108*		*40 - 110*	*10/20/21 11:24*	*11/17/21 10:57*	*1*

Method: 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	**0.460**		0.247	0.250	1.00	0.370	pCi/g	10/22/21 14:32	11/01/21 14:56	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*108*		*40 - 110*	*10/22/21 14:32*	*11/01/21 14:56*	*1*
Y Carrier	*83.4*		*40 - 110*	*10/22/21 14:32*	*11/01/21 14:56*	*1*

Method: Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	**1.31**		0.29	0.30	5.00	0.370	pCi/g		11/23/21 21:56	1

Qualifiers

Rad

Qualifier	Qualifier Description
U	Result is less than the sample detection limit.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

QC Association Summary

Rad

Prep Batch: 532819

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-206556-1	Pond 2S CCR	Total/NA	Solid	DPS-21	
MB 160-532819/4-A	Method Blank	Total/NA	Solid	DPS-21	
LCS 160-532819/1-A	Lab Control Sample	Total/NA	Solid	DPS-21	
500-206556-1 DU	Pond 2S CCR	Total/NA	Solid	DPS-21	

Prep Batch: 533200

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-206556-1	Pond 2S CCR	Total/NA	Solid	DPS-0	
MB 160-533200/4-A	Method Blank	Total/NA	Solid	DPS-0	
LCS 160-533200/1-A	Lab Control Sample	Total/NA	Solid	DPS-0	
500-206556-1 DU	Pond 2S CCR	Total/NA	Solid	DPS-0	

QC Sample Results

Client: KPRG and Associates, Inc.
Project/Site: Will County Ash Sample

Job ID: 500-206556-2

Method: 903.0 - Radium-226 (GFPC)

Lab Sample ID: MB 160-532819/4-A
Matrix: Solid
Analysis Batch: 537097

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 532819

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.01564	U	0.0963	0.0963	1.00	0.186	pCi/g	10/20/21 11:24	11/17/21 10:58	1

Carrier	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*49.0*		*40 - 110*	*10/20/21 11:24*	*11/17/21 10:58*	*1*

Lab Sample ID: LCS 160-532819/1-A
Matrix: Solid
Analysis Batch: 537097

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 532819

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits		
Radium-226			11.3	10.67		1.15	1.00	0.152	pCi/g	94	75 - 125		

Carrier	*LCS %Yield*	*LCS Qualifier*	*Limits*
Ba Carrier	*58.3*		*40 - 110*

Lab Sample ID: 500-206556-1 DU
Matrix: Solid
Analysis Batch: 537097

Client Sample ID: Pond 2S CCR
Prep Type: Total/NA
Prep Batch: 532819

Analyte	Sample Result	Sample Qual		DU Result	DU Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit			RER	RER Limit
Radium-226	0.847			0.7588		0.151	1.00	0.0875	pCi/g			0.28	1

Carrier	*DU %Yield*	*DU Qualifier*	*Limits*
Ba Carrier	*108*		*40 - 110*

Method: 904.0 - Radium-228 (GFPC)

Lab Sample ID: MB 160-533200/4-A
Matrix: Solid
Analysis Batch: 534585

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 533200

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.2167	U	0.496	0.496	1.00	0.851	pCi/g	10/22/21 14:32	11/01/21 14:57	1

Carrier	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*49.0*		*40 - 110*	*10/22/21 14:32*	*11/01/21 14:57*	*1*
Y Carrier	*78.9*		*40 - 110*	*10/22/21 14:32*	*11/01/21 14:57*	*1*

QC Sample Results

Client: KPRG and Associates, Inc.
Project/Site: Will County Ash Sample

Job ID: 500-206556-2

Method: 904.0 - Radium-228 (GFPC) (Continued)

Lab Sample ID: LCS 160-533200/1-A
Matrix: Solid
Analysis Batch: 534585

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 533200

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits		
Radium-228			9.19	10.73		1.39	1.00	0.690	pCi/g	117	75 - 125		

Carrier	*LCS %Yield*	*LCS Qualifier*	*Limits*
Ba Carrier	*58.3*		*40 - 110*
Y Carrier	*83.4*		*40 - 110*

Lab Sample ID: 500-206556-1 DU
Matrix: Solid
Analysis Batch: 534585

Client Sample ID: Pond 2S CCR
Prep Type: Total/NA
Prep Batch: 533200

Analyte	Sample Result	Sample Qual		DU Result	DU Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit			RER	RER Limit
Radium-228	0.460			0.5443		0.244	1.00	0.342	pCi/g			0.17	1

Carrier	*DU %Yield*	*DU Qualifier*	*Limits*
Ba Carrier	*108*		*40 - 110*
Y Carrier	*83.7*		*40 - 110*

Eurofins TestAmerica, Chicago

2417 Bond Street
University Park IL 60484
Phone 708-534-5200 Fax 708-534-5211

Chain of Custody Record

Client Information	Sampler: M. Ress	Lab PM Mockler Diana J	Carrier Tracking No(s)	COC No 500-95707-42336 1
Client Contact: Cory Higgins	Phone 630.602.7240	E-Mail Diana Mockler@Eurofinset com	State of Origin	Page Page 1 of 1
Company: KPRG and Associates Inc	PWSID	**Analysis Requested**		Job #: 500-206556

Address
414 Plaza Drive Suite 106

City:
Westmont

State Zip
IL 60559

Phone
779-279-2321(Tel)

Email
coryh@KPRGinc com

Project Name
Ash Sample

Site
Illinois

500-206556 COC

Due Date Requested

TAT Requested (days):

Compliance Project: Δ Yes Δ No

PO #
4502041043

WO #

Project #.
50011609

SSOW#

Preservation Codes

A	HCL	M	Hexane
B	NaOH	N	None
C	Zn Acetate	O	AsNaO2
D	Nitric Acid	P	Na2O4S
E	NaHSO4	Q	Na2SO3
F	MeOH	R	Na2S2O3
G	Amchlor	S	H2SO4
H	Ascorbic Acid	T	TSP Dodecahydrate
I	Ice	U	Acetone
J	DI Water	V	MCAA
K	EDTA	W	pH 4-5
L	EDA	Z	other (specify)

Other

Sample Identification	**Sample Date**	**Sample Time**	**Sample Type** (C=comp, G=grab)	**Matrix** (W=water S=solid O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	903.0 904.0	Ra226Ra228_GFPC - Combined Rad 226/228	4500_F_C 6010B 7471A, 9056A, Moisture SM4500_Cl_E	Total Number of containers	**Special Instructions/Note**
			Preservation Code				N	N	N		
1-Pond 2S CCR	10/11/21	11:30	C	Solid			X	X	X		• See attached
2-Pond 2S CCR	↓	11:35	C	↓			↓	↓	↓		list
3-Pond 2S CCR		11:40	C								
											·CCR appendix 3&4
											· Rush turn-around
											·Contact Josh Davenport
											w/ questions
											262-781-0475

Possible Hazard Identification
☐ Non Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For ________ Months

Deliverable Requested I II III IV Other (specify)

Special Instructions/QC Requirements ~~Rush turn-around~~

Empty Kit Relinquished by	Date	Time	Method of Shipment.

Relinquished by: Michael Ress	Date/Time 10/11/21 13:00	Company KPRG	Received by:	Date/Time 10/11/21@1300	Company ETA
Relinquished by:	Date/Time	Company	Received by:	Date/Time	Company
Relinquished by:	Date/Time	Company	Received by:	Date/Time	Company

Custody Seals Intact. Δ Yes Δ No	Custody Seal No	Cooler Temperature(s) °C and Other Remarks 155

Table 1 Ash Parameter List

Parameter
Antimony
Arsenic
Barium
Beryllium
Boron
Cadmium
Chloride
Chromium
Cobalt
Combined Radium 226 + 228 (pCi/L)
Fluoride
Lead
Lithium
Mercury
Molybdenum
pH (standard units)
Selenium
Sulfate
Thallium
Calcium

Eurofins TestAmerica, Chicago
2417 Bond Street
University Park, IL 60484
Phone: 708-534-5200 Fax: 708-534-5211

Chain of Custody Record

eurofins Environment Testing America

Client Information (Sub Contract Lab)

Client Contact: Shipping/Receiving
Sampler:
Lab PM: Mockler, Diana J
Carrier Tracking No(s):
COC No: 500-153240.1
Phone:
E-Mail: Diana.Mockler@Eurofinset.com
State of Origin: Illinois
Page: Page 1 of 1
Company: TestAmerica Laboratories, Inc.
Accreditations Required (See note): NELAP - Illinois
Job #: 500-206556-2
Address: 13715 Rider Trail North, ,
Due Date Requested: 11/14/2021
City: Earth City
TAT Requested (days):
State, Zip: MO, 63045
Phone: 314-298-8566(Tel) 314-298-8757(Fax)
PO #:
Email:
WO #:
Project Name: Will County CCR
Project #: 50011609
Site: NRG Midwest Generation Will County
SSOW#:

Analysis Requested

Preservation Codes:

- A - HCL
- B - NaOH
- C - Zn Acetate
- D - Nitric Acid
- E - NaHSO4
- F - MeOH
- G - Amchlor
- H - Ascorbic Acid
- I - Ice
- J - DI Water
- K - EDTA
- L - EDA
- M - Hexane
- N - None
- O - AsNaO2
- P - Na2O4S
- Q - Na2SO3
- R - Na2S2O3
- S - H2SO4
- T - TSP Dodecahydrate
- U - Acetone
- V - MCAA
- W - pH 4-5
- Z - other (specify)

Other:

Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	903.0/DPS_21 Radium 226	904.0/DPS_0 Radium 228	Ra226Ra228_GFPC/ Combined Rad 226/228	Total Number of containers	Special Instructions/Note:
			Preservation Code:								
Pond 2S CCR (500-206556-1)	10/11/21	11:30 Central		Solid			X	X	X	2	

Note: Since laboratory accreditations are subject to change, Eurofins TestAmerica places the ownership of method, analyte & accreditation compliance upon out subcontract laboratories. This sample shipment is forwarded under chain-of-custody. If the laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/tests/matrix being analyzed, the samples must be shipped back to the Eurofins TestAmerica laboratory or other instructions will be provided. Any changes to accreditation status should be brought to Eurofins TestAmerica attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said complicance to Eurofins TestAmerica.

Possible Hazard Identification
Unconfirmed

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For* ______ *Months*

Deliverable Requested: I, II, III, IV, Other (specify)
Primary Deliverable Rank: 2
Special Instructions/QC Requirements:

Empty Kit Relinquished by:
Date:
Time:
Method of Shipment:

Relinquished by: Shari Scott
Date/Time: 10/11/21 1415
Company: ETA-CHI
Received by: FED EX --
Date/Time:
Company

Relinquished by: FED EX
Date/Time:
Company
Received by: Micha Kemminger
Date/Time: OCT 12 2021 09:05
Company: ETA STL

Relinquished by:
Date/Time:
Company
Received by:
Date/Time:
Company

Custody Seals Intact: Δ Yes Δ No
Custody Seal No.:
Cooler Temperature(s) °C and Other Remarks:

1 2 3 4 5 6 7 8 9 10 11 12 13

eurofins | Environment Testing
TestAmerica

CONDITION UPON RECEIPT FORM

Client: Chicago

Initiated by: Aj Date: 10-12-21 Time: 0905 Shipper: FE Package Quantity: 1

Completed by: ________

Sample must be received at < 6°C for Wet Chem and Mercury. If not, note temp below.
Metal soil samples must be refrigerated upon receipt.
If samples are from West Virginia, please fill out form ADMIN-0031.

Thermometer ID (°C): **IR-2**

Thermometer CF (°C): **+0.7**

	Shipping #(s)	**Package Temp (°C)**	**Document #:**
1.	1893 4453 7040	20.1	
2.			
3.			
4.			
5.			
6.			
7.			

Condition (Circle "Y" for yes, "N" for no and "N/A" for not applicable):

1.	[✓ Y] N	Are there custody seals present on the cooler?	8.	Y [✓ N]	Are there custody seals present on bottles?
2.	Y [✓ N] N/A	Do custody seals on cooler appear to be tampered with?	9.	Y N [✓ N/A]	Do custody seals on bottles appear to be tampered with?
3.	[✓ Y] N	Were contents of cooler frisked after opening, but before unpacking?	10.	[✓ Y] N N/A	Was sample received with proper pH[1]? (If not, make note below) pH strip lot #: HC157842
4.	[✓ Y] N	Sample received with Chain of Custody?	11.	Y N [✓ N/A]	Containers for Rn-222, C-14, Cl-36, H-3 & I-129/131 marked with "Do Not Preserve" label?
5.	[✓ Y] N N/A	Does the Chain of Custody match sample ID's on the container(s)?	12.	[✓ Y] N	Sample received in proper containers?
6.	Y [✓ N]	Was sample received broken?	13.	Y N [✓ N/A]	Headspace in VOA, or Rn-222 liquid samples? (>6mm) (If Yes, note sample ID's below)
7.	[✓ Y] N	Is sample volume sufficient for analysis?	14.	Y N [✓ N/A]	Soil containers for C-14, H-3,Tc-99 & I-129/131 marked with "Do Not Dry" label?

[1] For DOE-AL (Pantex, LANL, Sandia) sites, pH of ALL containers received must be verified, EXCEPT VOA, Rn-222 and soils.

Notes:

pH Adjustment (if needed)	Date/Time of Preservation:
Initial pH and pH strip lot#:	Preservative and lot#:
Final pH and pH strip lot#:	Amount of Preservative:

Page **1** of **1**

ADMIN-0004 REV 25, REVISED 5/19/2021 Eurofins TestAmerica St. Louis

Login Sample Receipt Checklist

Client: KPRG and Associates, Inc.

Job Number: 500-206556-2

Login Number: 206556
List Number: 1
Creator: Scott, Sherri L

List Source: Eurofins TestAmerica, Chicago

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	Received same day of collection; chilling process has begun.
Cooler Temperature is recorded.	True	15.5
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Login Sample Receipt Checklist

Client: KPRG and Associates, Inc.

Job Number: 500-206556-2

Login Number: 206556
List Number: 2
Creator: Korrinhizer, Micha L

List Source: Eurofins TestAmerica, St. Louis
List Creation: 10/12/21 06:19 PM

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Lab Chronicle

Client Sample ID: Pond 2S CCR

Date Collected: 10/11/21 11:30
Date Received: 10/11/21 13:00

Lab Sample ID: 500-206556-1

Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	DPS-21			532819	10/20/21 11:24	SJS	TAL SL
Total/NA	Analysis	903.0		1	537097	11/17/21 10:57	ANW	TAL SL
Total/NA	Prep	DPS-0			533200	10/22/21 14:32	BMP	TAL SL
Total/NA	Analysis	904.0		1	534585	11/01/21 14:56	FLC	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	538415	11/23/21 21:56	EMH	TAL SL

Laboratory References:

TAL SL = Eurofins TestAmerica, St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Method: 903.0 - Radium-226 (GFPC)

Matrix: Solid **Prep Type: Total/NA**

Percent Yield (Acceptance Limits)

Lab Sample ID	Client Sample ID	Ba (40-110)
500-206556-1	Pond 2S CCR	108
500-206556-1 DU	Pond 2S CCR	108
LCS 160-532819/1-A	Lab Control Sample	58.3
MB 160-532819/4-A	Method Blank	49.0

Tracer/Carrier Legend

Ba = Ba Carrier

Method: 904.0 - Radium-228 (GFPC)

Matrix: Solid **Prep Type: Total/NA**

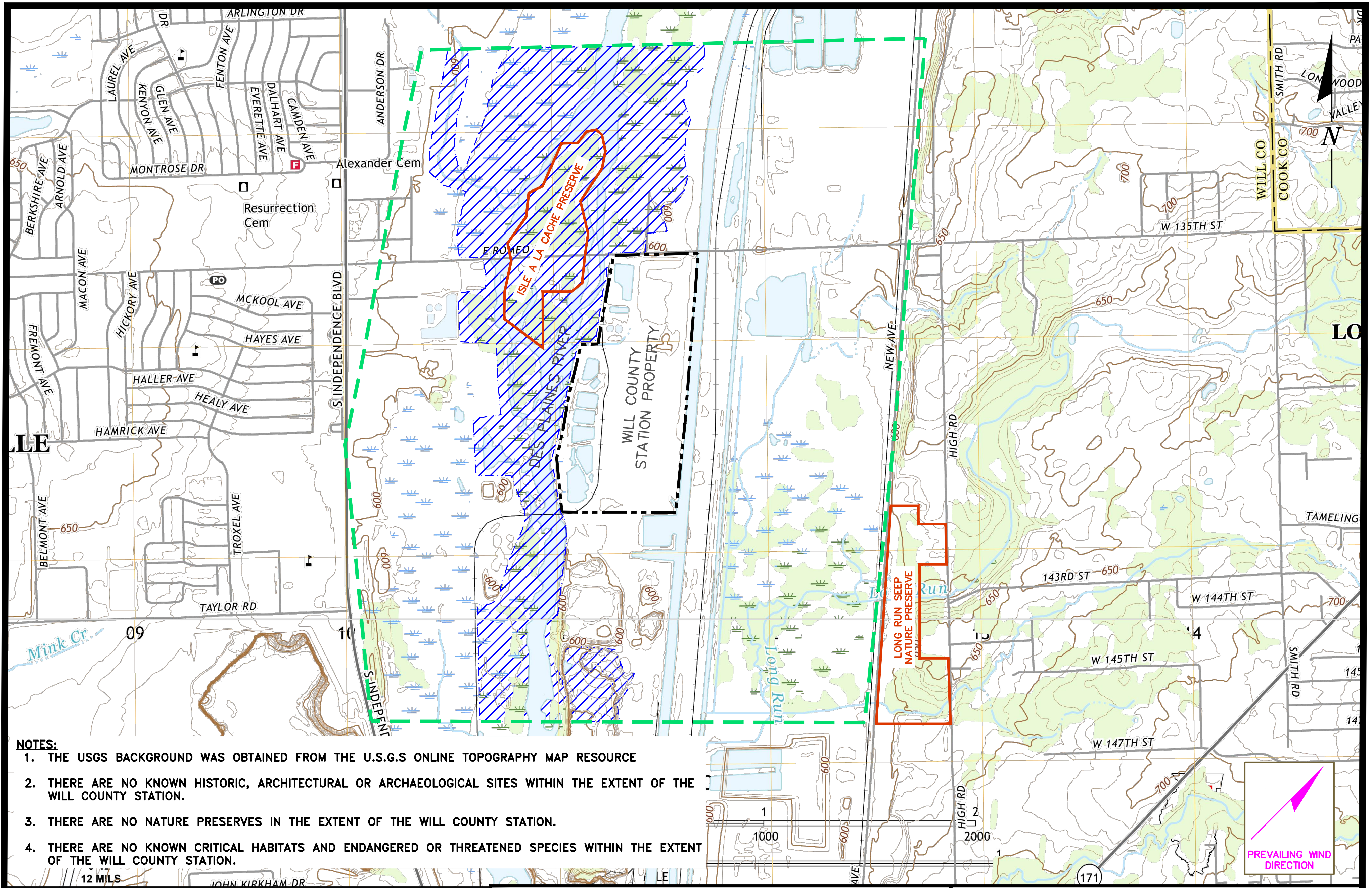
Percent Yield (Acceptance Limits)

Lab Sample ID	Client Sample ID	Ba (40-110)	Y (40-110)
500-206556-1	Pond 2S CCR	108	83.4
500-206556-1 DU	Pond 2S CCR	108	83.7
LCS 160-533200/1-A	Lab Control Sample	58.3	83.4
MB 160-533200/4-A	Method Blank	49.0	78.9

Tracer/Carrier Legend

Ba = Ba Carrier
Y = Y Carrier

ATTACHMENT 3
SITE LOCATION MAP



NOTES:

1. THE USGS BACKGROUND WAS OBTAINED FROM THE U.S.G.S ONLINE TOPOGRAPHY MAP RESOURCE
2. THERE ARE NO KNOWN HISTORIC, ARCHITECTURAL OR ARCHAEOLOGICAL SITES WITHIN THE EXTENT OF THE WILL COUNTY STATION.
3. THERE ARE NO NATURE PRESERVES IN THE EXTENT OF THE WILL COUNTY STATION.
4. THERE ARE NO KNOWN CRITICAL HABITATS AND ENDANGERED OR THREATENED SPECIES WITHIN THE EXTENT OF THE WILL COUNTY STATION.

LEGEND

- - -	3,280 FEET BOUNDARY
▨	LIMITS OF 100-YEAR FLOODPLAIN
-·-·-	PROPERTY BOUNDARY
—	NATURE PRESERVE (OFF STATION PROPERTY)

0 2,000'

APPROXIMATE SCALE

ENVIRONMENTAL CONSULTATION & REMEDIATION

KPRG

KPRG and Associates, inc.

14665 West Lisbon Road, Suite 1A Brookfield, Wisconsin 53005 Telephone 262-781-0475 Facsimile 262-781-0478

414 Plaza Drive, Suite 106 Westmont, Illinois 60559 Telephone 630-325-1300 Facsimile 630-325-1593

SITE LOCATION MAP

WILL COUNTY GENERATING STATION
ROMEOVILLE, ILLINOIS

Scale: 1" = 2,000'
Date: July 28, 2023
KPRG Project No. 19620.3
FIGURE 3

W:\projects\midwest generation\operating and constr permit\waukegan\waukegan station.dwg

ATTACHMENT 4
SITE PLAN MAPS

ENVIRONMENTAL CONSULTATION & REMEDIATION

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KPRG and Associates, inc.

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414 Plaza Drive, Suite 106 Westmont, Illinois 60559 Telephone 630-325-1300 Facsimile 630-325-1593

SITE PLAN MAP

WILL COUNTY STATION
ROMEOVILLE, ILLINOIS

Scale: 1" = 500'

Date: July 28, 2023

KPRG Project No. 19620.3

FIGURE 4-1

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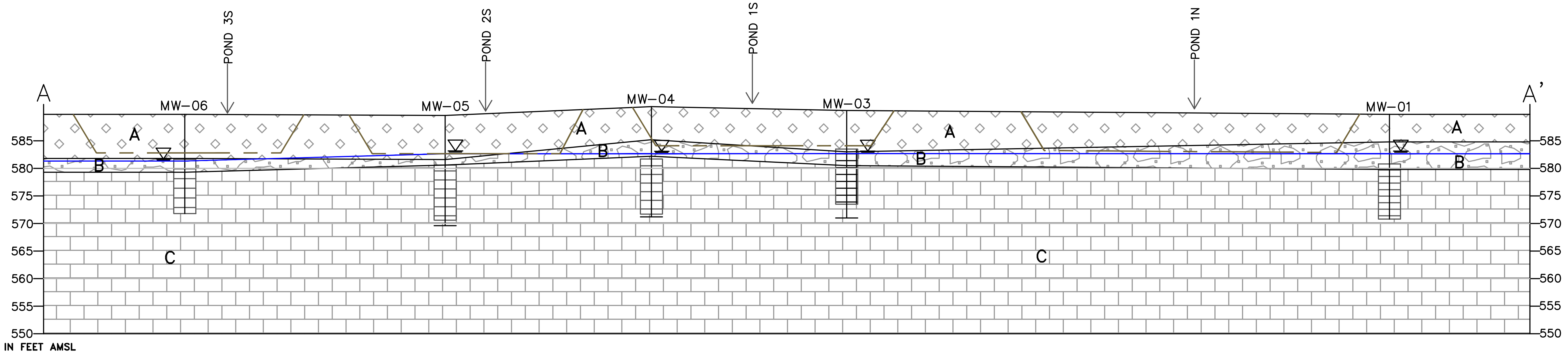


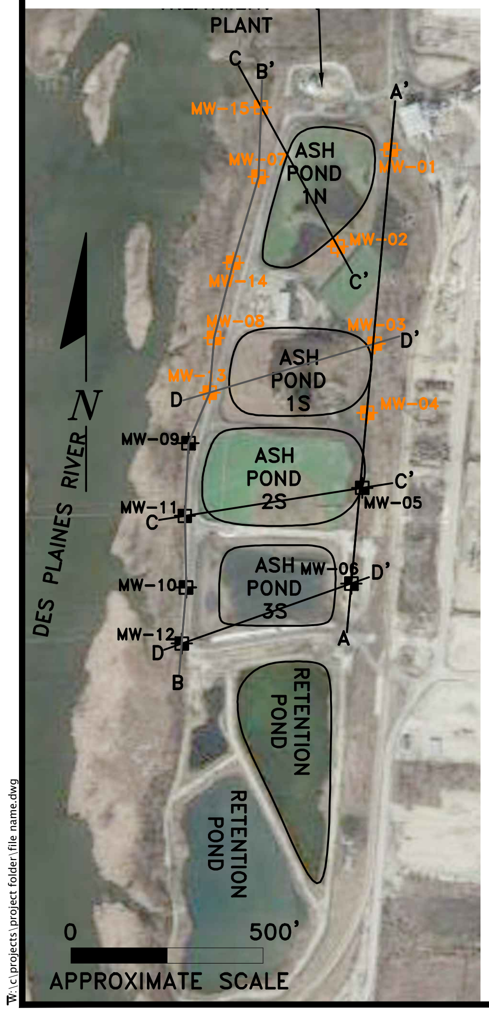
A FILL: CONSISTING OF BROWN AND BLACK SILTY CLAY AND SILTY SAND MIXED WITH GRAVEL AND CRUSHED LIMESTONE. THE FILL MAY INCLUDE COAL, BLACK CINDERS AND SLAG.

B SILTY SAND, SILT AND CLAY: CONSISTING OF GRAVELLY TAN TO BROWN SILTY SAND FINING DOWNWARD TO GRAY/GREENISH MOTTLED SILTY CLAYS AND CLAY.

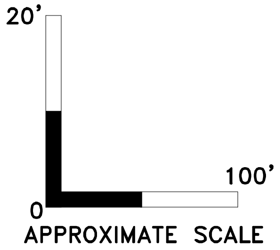
C BEDROCK: DOLIMTE BEDROCK. TOP OF WEATHERED BEDROCK IS GENERALLY ENCOUNTERED BETWEEN 9 FEET AND GREATER THAN 20 FEET BELOW GROUND SURFACE WITH DEPTH INCREASING TOWARDS THE SOUTHWEST. IT IS NOTED THAT AT MONITORING WELL LOCATION MW-12, TOP OF BEDROCK WAS NOT ENCOUNTERED AT THE TERMINUS OF THE BORING AT 20 FEET BELOW GROUND SURFACE.

▽ WATER LEVEL (5/21)

—— — —— PROJECTED POND OUTLINE



W:\c\projects\project folder\file name.dwg



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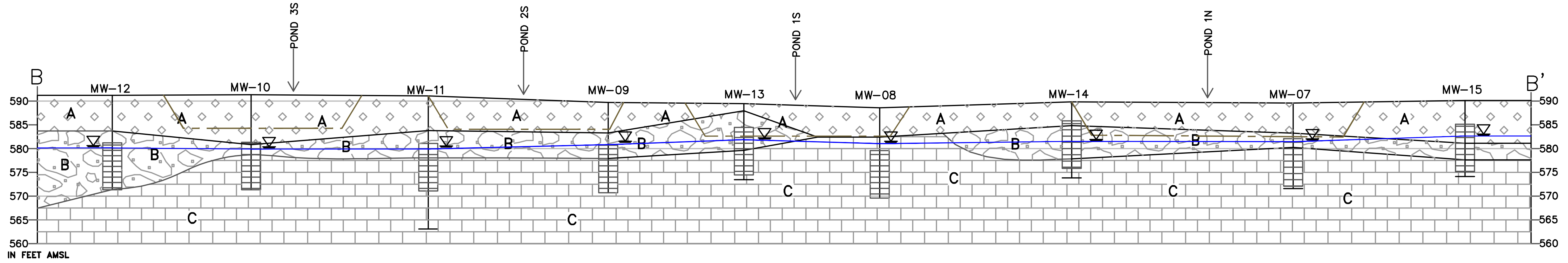
CROSS SECTION A-A'

WILL COUNTY STATION
ROMEOVILLE, ILLINOIS

SEE SCALE	Date: March 24, 2022
KPRG Project No. 19520.3	FIGURE 4-2



A | FILL: CONSISTING OF BROWN AND BLACK SILTY CLAY AND SILTY SAND MIXED WITH GRAVEL AND CRUSHED LIMESTONE. THE FILL MAY INCLUDE COAL, BLACK CINDERS AND SLAG.

B | SILTY SAND, SILT AND CLAY: CONSISTING OF GRAVELLY TAN TO BROWN SILTY SAND FINING DOWNWARD TO GRAY/GREENISH MOTTLED SILTY CLAYS AND CLAY.

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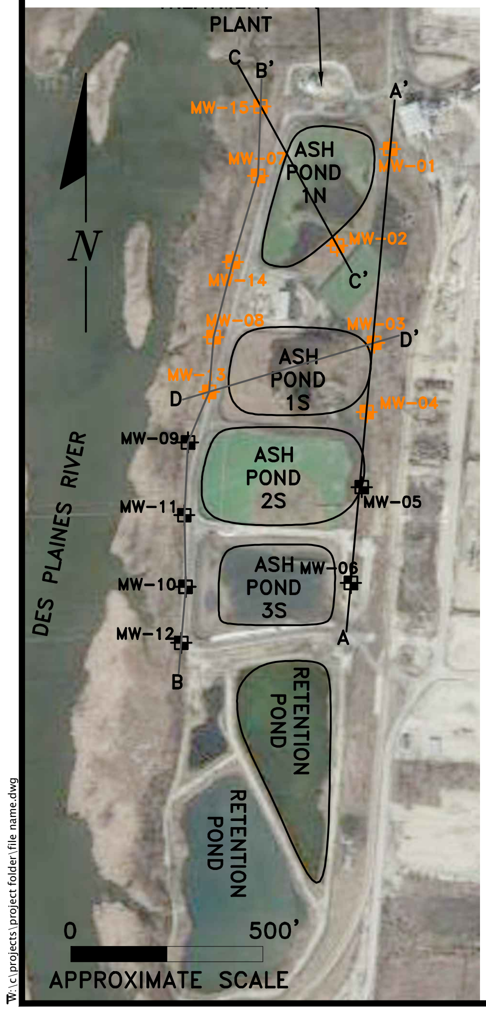
▽ WATER LEVEL (5/21)

—— — —— PROJECTED POND OUTLINE



25'
125'
0
APPROXIMATE SCALE

E N V I R O N M E N T A L C O N S U L T A T I O N & R E M E D I A T I O N

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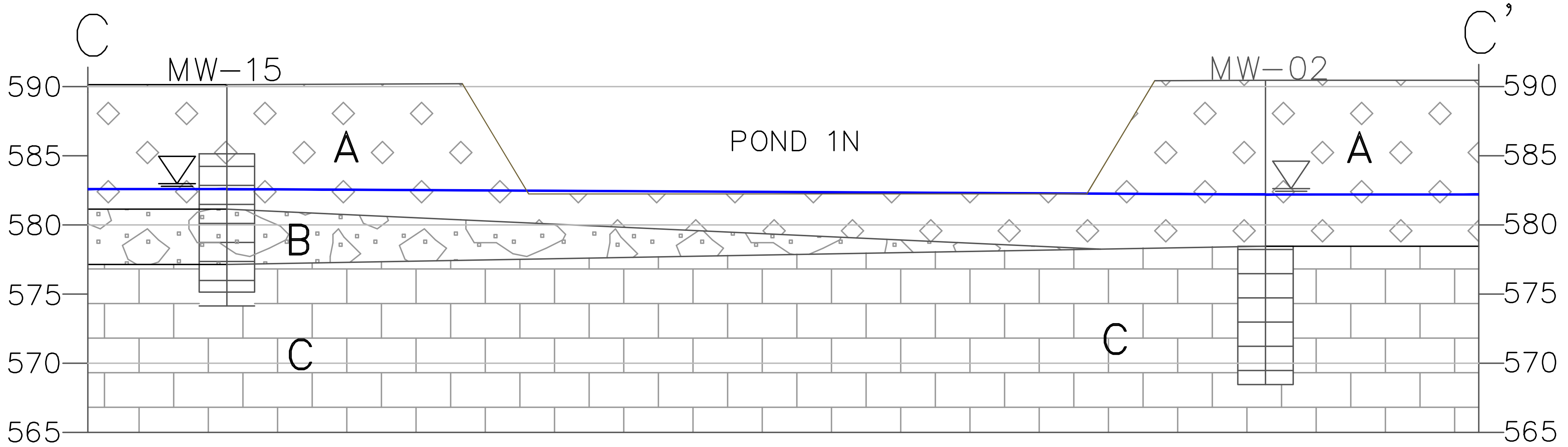
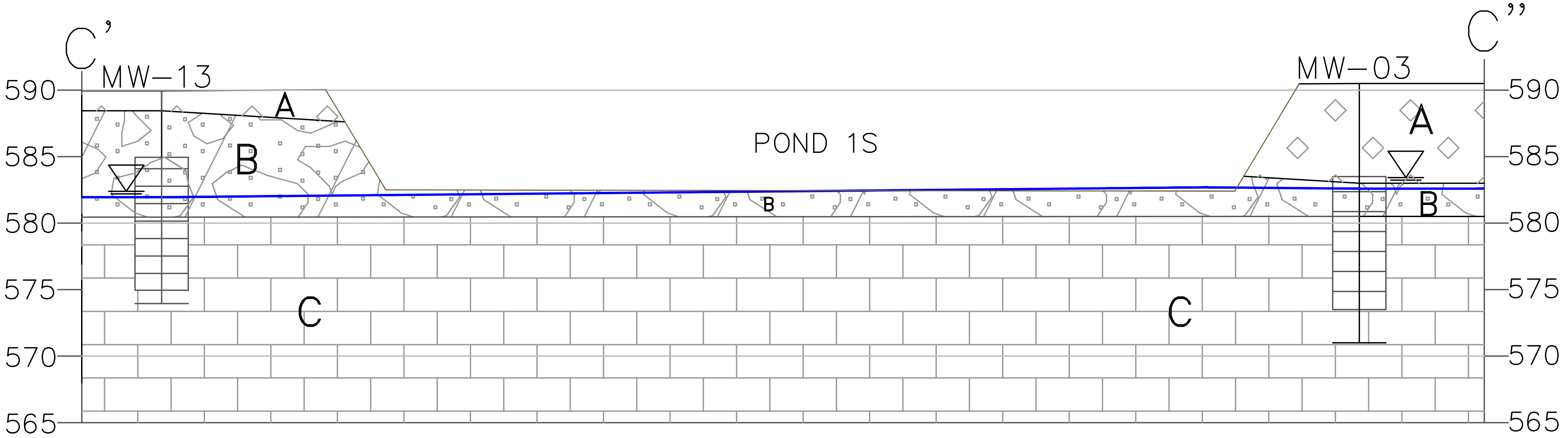
CROSS SECTION B–B'

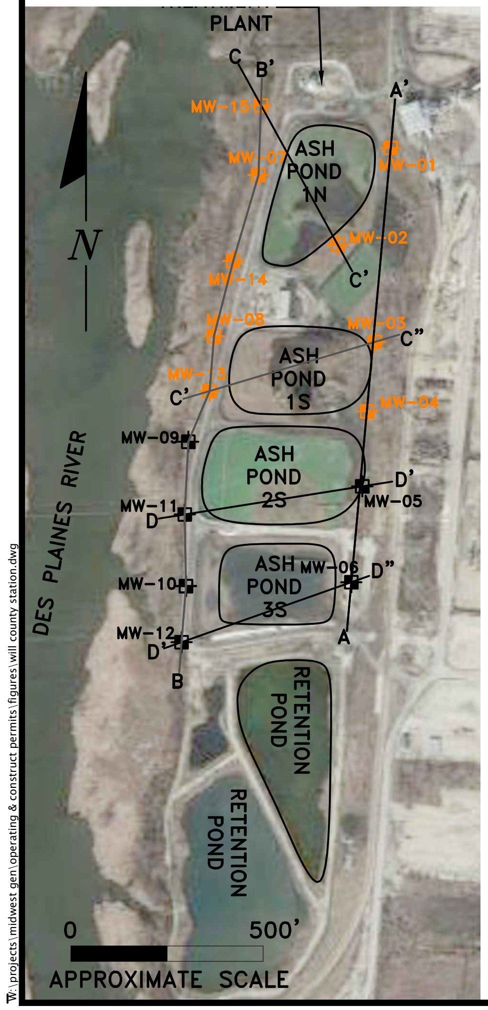
WILL COUNTY STATION
ROMEOVILLE, ILLINOIS

SEE SCALE | Date: March 24, 2022

KPRG Project No. 19520.3 | FIGURE 4–3







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A — FILL: CONSISTING OF BROWN AND BLACK SILTY CLAY AND SILTY SAND MIXED WITH GRAVEL AND CRUSHED LIMESTONE. THE FILL MAY INCLUDE COAL, BLACK CINDERS AND SLAG.

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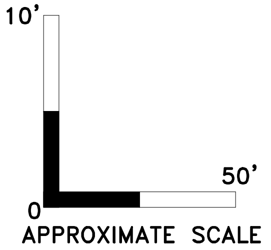
C — BEDROCK: DOLIMTE BEDROCK. TOP OF WEATHERED BEDROCK IS GENERALLY ENCOUNTERED BETWEEN 9 FEET AND GREATER THAN 20 FEET BELOW GROUND SURFACE WITH DEPTH INCREASING TOWARDS THE SOUTHWEST. IT IS NOTED THAT AT MONITORING WELL LOCATION MW–12, TOP OF BEDROCK WAS NOT ENCOUNTERED AT THE TERMINUS OF THE BORING AT 20 FEET BELOW GROUND SURFACE.

▽ WATER LEVEL (5/21)

POND OUTLINE



ENVIRONMENTAL CONSULTATION & REMEDIATION

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414 Plaza Drive, Suite 106 Westmont, Illinois 60559 Telephone 630-325-1300 Facsimile 630-325-1593

POND 1N CROSS SECTION C–C' and
POND 1S CROSS SECTION C'–C"

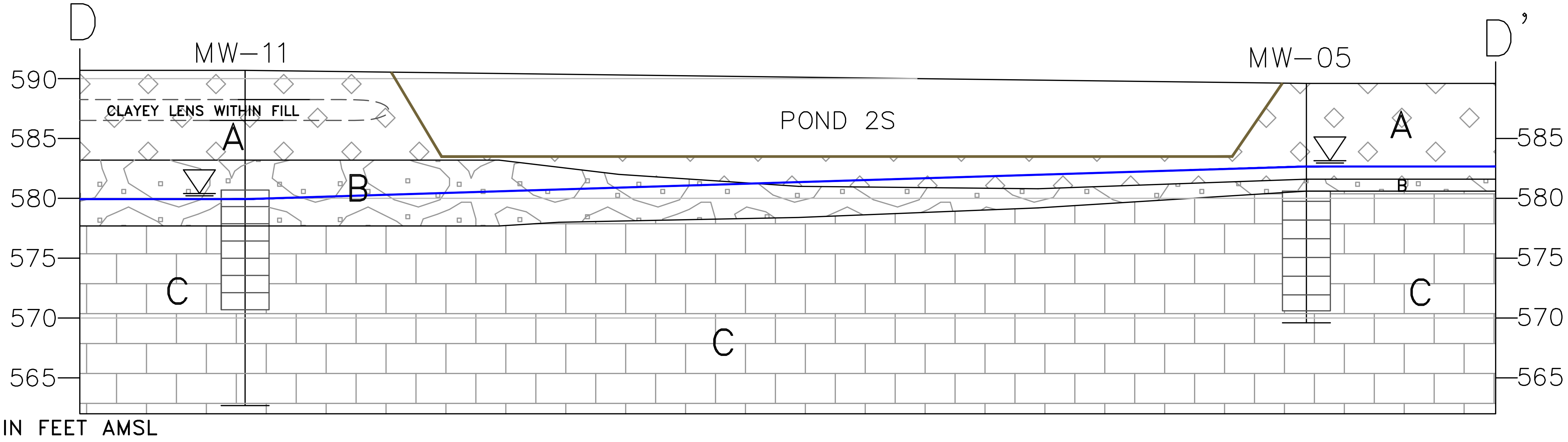
WILL COUNTY STATION
ROMEOVILLE, ILLINOIS

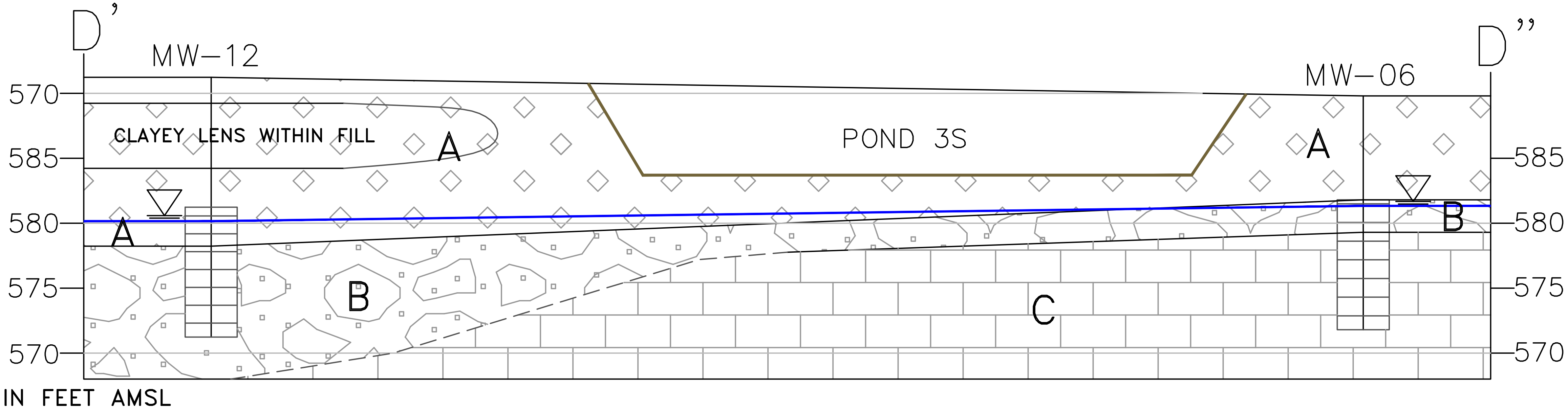
SEE SCALE

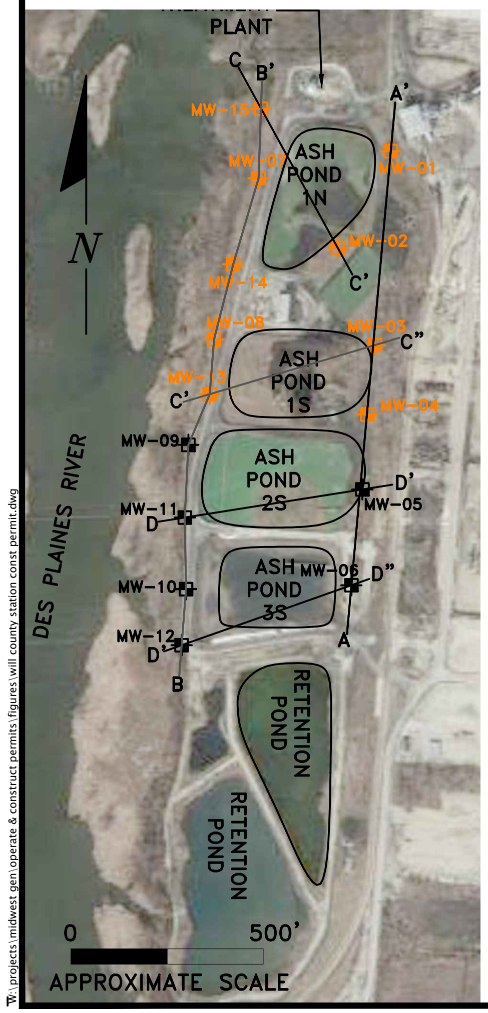
Date: July 28, 2023

KPRG Project No. 19520.3

FIGURE 4–4







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A	FILL: CONSISTING OF BROWN AND BLACK SILTY CLAY AND SILTY SAND MIXED WITH GRAVEL AND CRUSHED LIMESTONE. THE FILL MAY INCLUDE COAL, BLACK CINDERS AND SLAG.
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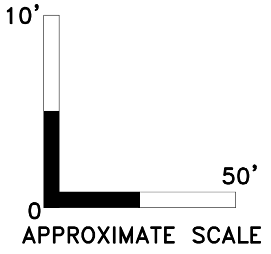
▽	WATER LEVEL (5/21)
—	POND OUTLINE



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414 Plaza Drive, Suite 106 Westmont, Illinois 60559 Telephone 630-325-1300 Facsimile 630-325-1593

POND 2S CROSS SECTION D-D' and
POND 3S CROSS SECTION D'-D"

WILL COUNTY STATION
ROMEOVILLE, ILLINOIS

SEE SCALE

Date: July 28, 2023

KPRG Project No. 19620.3

FIGURE 4-5

ATTACHMENT 5
CLOSURE DRAWINGS AND SPECIFICATIONS

MWG
Midwest Generation, LLC

WILL COUNTY GENERATING STATION

SPECIFICATION W-9100

CLOSURE OF
PONDS 1N, 1S, 2S, AND 3S

S&L PROJECT NO.: 12661-153

REVISION 0

ISSUE PURPOSE: PERMIT

ISSUE DATE: 07-28-2023

Sargent & Lundy

SECTION 000106

ISSUE SUMMARY AND APPROVAL PAGE

Rev.	Purpose of Issue	Date	Sections Affected
0	Permit	07-28-2023	All

This is to confirm that this Specification has been prepared, reviewed, and approved in accordance with Sargent & Lundy's Standard Operating Procedure SOP-0407, Specifications, which is part of our Quality Management System.

Contributor Summary & Current Revision Signatures

Rev.	Prepared By	Reviewed By	Approved By
0	Aimee Sahlas A. Sahlas	T. Dehlin	T. Dehlin

SECTION 000107

CERTIFICATION PAGE

Sargent & Lundy, L.L.C. (S&L) is registered in the State of Illinois to practice engineering. S&L's Illinois Department of Financial and Professional Regulation registration number is 184-000106.

I certify that this Specification was prepared by me or under my direct supervision and that I am a registered professional engineer under the laws of the State of Illinois.

Certified By: Thomas J. Dehlin Date: July 28, 2023

Seal:

THOMAS J. DEHLIN
062-069314

SECTION 000110

TABLE OF CONTENTS

DIVISION 00 – PROCUREMENT AND CONTRACTING

DIVISION 01 - GENERAL REQUIREMENTS

DIVISION 31 - EARTHWORK

ATTACHMENTS

END OF SECTION 000110

SECTION 011100

SUMMARY OF WORK

PART 1 - GENERAL

101. PROJECT INFORMATION

101.1	Owner:	Midwest Generation, LLC (MWG)
101.2	Design Engineer:	Sargent & Lundy (S&L)
101.3	Project Name:	Closure of Ponds 1N, 1S, 2S, and 3S
101.4	Project Location:	Will County Generating Station 529 E. Romeo Rd. Romeoville, IL 60446

102. DESCRIPTION OF THE PROJECT AND GENERAL BACKGROUND

102.1 The purpose of this project is to close Ponds 1N, 1S, 2S, and 3S at Midwest Generation, LLC's Will County Generating Station in accordance with the Illinois Pollution Control Board's Coal Combustion Residuals (CCR) Rule, 35 Ill. Adm. Code Part 845, and to close Ponds 2S and 3S in accordance with the U.S. Environmental Protection Agency's (EPA) CCR Rule, 40 CFR Part 257 Subpart D.

102.2 Ponds 1N, 1S, 2S, and 3S will be closed by leaving CCR and CCR-mixed materials stored in the ponds in-place and installing a final cover system over each pond.

103. SCOPE OF WORK

103.1 In general, this Specification covers the technical requirements for a General Work (GW) Contractor to close Ponds 1N, 1S, 2S, and 3S at the Will County Generating Station. The Work includes the following activities:

a. Furnishing and installing temporary sediment and erosion control best management practices (BMPs) prior to and during all phases of earth disturbance work.

b. Closing Ponds 1N and 1S in accordance with the Illinois CCR Rule by:

b1. Clearing, grubbing, and/or stripping vegetation within the pond areas as delineated on the Design Drawings, with offsite disposal of material in a permitted landfill approved by the Owner.

b2. Regrading CCR within the ponds to establish the lines and grades for the ponds' final cover systems as specified on the Design Drawings.

b3. Installing an engineering final cover system, ClosureTurf® (or Owner-approved equal), over the regraded CCR. ClosureTurf® is a multi-component final cover system design by Watershed Geo that consists of a structured geomembrane, a synthetic turf, and a ballast infill.

c. Closing Ponds 2S and 3S in accordance with the Illinois and EPA CCR Rules by:

c1. Dewatering, stabilizing, and preparing the CCR and CCR-mixed materials stored in the pond to receive Structural Fill. Water removed from the ponds shall be discharged into the ponds' concrete effluent troughs in accordance with the effluent limitations in the Station's National Pollutant Discharge Elimination System (NPDES) permit. All discharge methods shall be approved by the Owner prior to the GW Contractor discharging any water.

c2. Placing, compacting, and grading Structural Fill to establish the lines and grades for the ponds' final cover systems as specified on the Design Drawings.

c3. Installing an engineered final cover system, ClosureTurf® (or Owner-approved equal), over the Structural Fill.

d. Restoring and cleaning the project and borrow areas.

e. GW Contractor shall allow access to all work areas by Owner, Design Engineer, CQA Contractor staff, and other parties as approved by Owner. GW Contractor shall not install, modify, repair or work on any elements of the project that are subject to the CQA testing and inspection services without notifying the CQA firm at least 2 work days in advance. Work on weekends or holidays shall be scheduled as soon as possible with the CQA Contractor. Failure to provide CQA Contractor adequate advanced notice to staff the site shall result in a hold on work until the CQA Contractor staff arrive on site.

103.2 In addition, the Work shall include but not be limited to the following:

a. Engineering and construction services required to perform or install the Work.

b. Surveying to ensure the proper liners and grades of the Work.

c. Furnishing all installation equipment and tools required to perform the Work, including any calibrated instruments required for monitoring and testing.

d. Maintaining the project site in a dry condition, which includes dewatering of all areas that collect storm water or groundwater in the area controlled by the GW Contractor and redirecting any surface water as a result of rainfall. Any water which requires removal from the area of work shall be disposed of in compliance with the Will County Generating Station's NPDES permit. All discharge methods shall be approved by the Owner prior to the GW Contractor discharging any water.

e. Disposing of construction related debris in an off-site, permitted landfill approved by the Owner.

f. Maintaining a record of the installation (i.e., as-built drawings) in accordance with the technical requirements of this Specification.

g. Furnishing the services of qualified personnel at the project site to perform the Work.

h. Progress reporting as specified in the Commercial Terms and Conditions.

i. Daily site cleanup and disposal of waste and debris.

j. Participation in the Owner's on-site safety program, including the Owner's CCR Safety and Health Plan Training.

103.3 The Work shall conform to the requirements of this Specification and shall be performed and supervised by personnel who are experienced and knowledgeable in the crafts and trades required by the Scope of Work. The Work shall be performed exclusively by the GW Contractor's trained and competent personnel or, where permitted, that of its subcontractor(s); and shall comply with all applicable safety laws, regulations, programs, and practices to ensure the safety of all people located on the work site, including the GW Contractor's personnel (or that of its subcontractor(s)) performing the Work.

103.4 Performance of the Work shall include all the labor, supervision, administration, management, material procurement, tools, installation and testing equipment, miscellaneous material, and consumables to perform the Work specified herein.

103.5 Provide all installation equipment and all incidental items not shown or specified but reasonably implied for successful completion of the Work and in strict accordance with Design Drawings and this Specification, including inspection, testing, and quality standards.

103.6 Provide installation quality assurance and quality control submittals where required.

103.7 Prepare red-lined as-built drawings for review upon completion of the Work to document any variances between the construction issue of the Design Drawings and the actual installation. Finalize as-built drawings after the Owner and the Design Engineer review.

103.8 All other work as indicated on the Design Drawings, as specified herein, or as required to properly complete the Work.

104. MATERIAL AND SERVICES FURNISHED BY OTHERS

104.1 The following work has been, or will be, performed and/or provided by Others:

a. Construction Quality Assurance services as detailed in Specification W-9101 will be procured by the Owner.

105. DEFINITIONS

105.1 The term "Design Drawing" means the Design Engineer's drawings indicating the Work to be performed.

105.2 The term "Work" means the material and services furnished to close Ponds 1N, 1S, 2S, and 3S as identified on the Design Drawings and as specified herein.

105.3 The term "Owner-approved equal" means an acceptable equivalent to a specified material that has been accepted by the Owner.

106. INTENT OF DOCUMENTS

106.1 The Contract Documents are complementary, and what is called for by any one shall be as binding as if called for by all. The intention of the documents is to include all labor, material, equipment, and transportation necessary for the proper execution of the Work.

106.2 Discrepancies between the Design Drawings and this Specification, or errors or omissions or mis-description in either the Design Drawings or in this Specification, shall be referred to the Design Engineer for interpretation and adjustment prior to beginning the Work. Do not proceed without the Design Engineer’s written acceptance.

107. PERFORMANCE OF THE WORK

107.1 The GW Contractor shall provide materials and employ construction practices that are sustainable to the greatest extent possible, including disposal of waste.

107.2 The GW Contractor shall provide a representative that will input and provide daily force reports and daily production reports.

107.3 The performance of the Work, as specified herein and as indicated on the Design Drawings, shall comply with the current safety and health standards authorized by the U.S. Department of Labor's Occupational Safety and Health Administration, as well as state and local jurisdictional requirements.

107.4 The GW Contractor shall take all appropriate precautions to ensure the safety of all people working on site.

107.5 The GW Contractor shall maintain the necessary skilled and qualified labor force for the Work to ensure the on-time completion of the Work.

107.6 The GW Contractor's personnel shall be competent, capable, qualified, and able to perform the duties required to the satisfaction of the Owner. A supervisor vested with authority to make decisions binding on the GW Contractor shall be assigned to the task to resolve installation problems as they arise so as not to delay completion of the Work.

107.7 The GW Contractor shall be solely responsible for advising the Design Engineer in writing of any conflicts between this Specification and the Design Drawings and the GW Contractor's drawings, including performance and levels of quality. The GW Contractor agrees that its obligations, liabilities, and warranties shall not be diminished or extinguished due to its meeting the requirements of this Specification and the Design Drawings.

108. REGULATORY REQUIREMENTS

108.1 The GW Contractor shall at all times be solely responsible for complying with all applicable laws, ordinances, regulations, and codes, including those relating to safety of all persons, in connection with the Work. No obligation of the Owner or Design Engineer shall impose upon them any duty to review the GW Contractor's compliance with safety measures.

109. PROTECTION OF PROPERTY AND PERSONNEL SAFETY

109.1 The GW Contractor shall take adequate precautions to protect existing structures, fences, pavements, aboveground utilities, and underground utilities, and to avoid damage thereto. The GW Contractor shall, at its own expense, repair any damage caused by its operations or by its subcontractors’ operations.

109.2 The GW Contractor shall conduct safety training of all its personnel (including any subcontractors) in accordance with the Owner's safety requirements, including the Owner’s CCR Safety and Health Plan.

109.3 The GW Contractor shall take adequate precautions to protect the Des Plaines River, other waterways, and adjacent properties from environmental damage.

110. CLEAN-UP AND DISPOSAL OF DEBRIS

110.1 The GW Contractor shall be responsible for clean-up and disposal of all debris resulting from the installation work. All excavated material and other construction related debris shall be properly disposed of (i.e., in an environmentally responsible way) offsite in a permitted landfill approved by the Owner.

110.2 Clean up, disposal, and site restoration, if required, shall be in compliance with the applicable requirements of all access permits. If any additional permits are required for disposal of debris, these shall be the responsibility of the GW Contractor.

110.3 Work areas shall be kept clean and orderly at all times with as little disturbance as possible to existing conditions. Upon completion of work at each site, all tools, equipment, material, and debris shall be completely removed and the area left in a clean condition.

111. EXISTING SITE CONDITIONS

111.1 Existing Underground Obstructions:

a. The GW Contractor shall be responsible for location of underground utilities and obstructions prior to performance of the Work and shall promptly notify Owner of any potential interferences that may impact performance of the Work. Modifications to the design to resolve these interferences shall not be implemented until approved by the Owner.

b. If uncharted utilities or obstructions are encountered during the performance of the Work, the GW Contractor shall notify the Owner of any such uncharted utilities or obstructions that would prohibit proper completion of the Work for resolution.

111.2 Prior to performing any Work in any part of the project site, the GW Contractor shall make a thorough field check for the purposes of verifying existing conditions that may affect the Work. The GW Contractor shall include a thorough investigation of the potential interferences and difficulties that it may encounter in the proper and complete execution of the Work, including the field location and identification of underground and overhead utilities within and adjacent to the limits of the Work. The GW Contractor shall advise the Owner immediately of the discovery of any conditions, including the existence of underground and overhead utilities that may affect the timely and safe execution of the Work.

111.3 The GW Contractor further acknowledges that it has satisfied itself as to the character, quality, and quantity of surface and subsurface material and obstacles, including underground or embedded utilities, to be encountered insofar as this information is reasonably ascertainable from:

a. An inspection of the site (including field location and identification of underground utilities).

b. Reference drawings made available by the Owner.

c. Drawings and specifications that are a part of the Contract.

d. The character and extent of existing work within or adjacent thereto.

e. Any other work being performed thereon at the time of the submission of bids.

111.4 Should the GW Contractor fail to perform any of the obligations set forth above, the GW Contractor’s later plea of ignorance of existing or foreseeable conditions which create difficulties or hindrances in the execution of the Work will not be considered as an excuse for any failure on the part of the GW Contractor to fulfill in every detail the requirements of the Contract nor will such a plea be acceptable as the basis of a claim for additional compensation or time to complete the work.

112. VERIFICATION OF DIMENSIONS ON DRAWINGS AND MEASUREMENTS AT SITE

112.1 The GW Contractor shall make a thorough field check for the purpose of verifying existing conditions that may affect the Work, such as existing topographic data shown on the Design Drawings, difficulties that might be encountered in the execution of the Work for any reason, and dimensions and other questions relating to interconnection of the Work with the existing ash pond construction.

112.2 The GW Contractor shall satisfy itself as to the accuracy of the dimensions of the existing ash pond construction as such dimensions relate to the dimensions given on any drawing issued by the Design Engineer. It shall be understood that neither the Design Engineer nor the Owner guarantee the exactness of such dimensions.

112.3 Should the GW Contractor discover any variation in the dimensions of existing conditions and the dimensions given on any drawings issued by the Design Engineer, the GW Contractor shall give immediate notice thereof to the Owner and the GW Contractor shall not proceed with the Work until such variation is resolved.

113. SOIL DATA

113.1 A structural stability and factor of safety assessment for Ponds 1N, 1S, 2S, and 3S was prepared in September 2021. Site specific soil data and geotechnical recommendations are provided and referenced therein. The geotechnical information in and referenced by this assessment indicates the general character of the subsurface conditions at the site. This information is made available for the GW Contractor's information and for interpretation of soil and water conditions that may be encountered at the site. The logs and test data that are provided are not to be taken as a complete description of the site soil and water information, but only display what was found in borings at the indicated locations. The Owner and the Design Engineer take no responsibility for the accuracy of this information.

113.2 The GW Contractor may obtain additional subsurface information, as it deems necessary, for installation purposes.

114. LINES AND GRADES

114.1 The GW Contractor shall use the existing benchmarks established at the site, as identified on the survey drawings included in the reference documents for the project, to lay out lines and grades on the project site. The GW Contractor is fully responsible for the correctness of such lines and grades and for proper execution of work to such lines and grades.

114.2 The Owner reserves the right to verify correctness of lines and grades during progress of the Work. Such verification by the Owner will not relieve the GW Contractor of responsibility as herein specified.

114.3 The GW Contractor shall preserve and maintain existing benchmarks and reference points established at the project site. Should the GW Contractor, during the execution of the Work, destroy or remove any existing benchmark or reference point, the cost to the Owner for re-establishing the benchmark or reference point will be charged to the GW Contractor.

115. CONTROL AND CHARGE OF CONTRACTOR’S WORK

115.1 The Design Engineer shall have no authority to stop the Work by the GW Contractor for any reason.

115.2 The GW Contractor shall be responsible for the safety of its employees and subcontractors and for maintaining the safety of the job site.

115.3 The GW Contractor shall be solely responsible for construction means, methods, techniques, sequences, and procedures used in the construction of the Work. The Owner, however, reserves the right to request, and the GW Contractor shall supply, detailed information regarding the Work such as procedures or work methods.

115.4 Only the Owner (or its authorized representative) has the authority to stop the Work (in accordance with the Commercial Terms and Conditions) if such Work is determined to be not in accordance with this Specification, the Design Drawings, or the Contract documents.

116. DESIGN DRAWINGS

116.1 The Design Drawings prepared by the Design Engineer indicate the physical dimensions of the Work to be installed as defined by the Scope of Work and form a part hereof.

116.2 Refer to Attachment 1 of this Specification for the applicable Design Drawings for this project.

117. REFERENCE DOCUMENTS

117.1 The reference documents assembled by the Design Engineer are for information only.

117.2 Refer to Attachments 2 and 3 of this Specification for applicable reference documents for this project.

END OF SECTION 011100

SECTION 311522

ENGINEERED SYNTHETIC TURF FOR FINAL COVER SYSTEM

PART 1 - GENERAL

101. EXTENT

101.1 This section defines the minimum requirements for the material and installation of an engineered synthetic turf to be used in the ClosureTurf® final cover system (or Owner-approved equal) for Ponds 1N, 1S, 2S, and 3S, all in accordance with the Design Drawings and as specified herein.

101.2 The Work shall include, but not be limited to, the following items:

a. Manufacture, shipping, handling, and storage of synthetic turf materials.

b. Placement, splicing, and anchorage of synthetic turf.

c. Field testing of synthetic turf seams.

d. Repair of defects, holes, or tears in synthetic turf.

e. Visual inspection of the completed synthetic turf cover.

f. Placement of ballast infill between tufts of synthetic turf.

101.3 Definitions of Terms: The following definitions of terms shall apply throughout this section.

a. GW Contractor is contracted by and responsible to the Owner to perform all of the work specified herein. They may self-perform or subcontract the work. The final division of responsibilities between the Earthwork Contractor and Geosynthetics Contractor will be the responsibility of the GW Contractor.

b. Earthwork Contractor: The contractor who is generally responsible for earthwork for the facility and for excavation and backfill of anchor trenches. The Earthwork Contractor may be the GW Contractor or a subcontractor to the GW Contractor.

c. Geosynthetics Contractor: The contractor who is generally responsible for the supply and installation of all geomembrane and synthetic turf materials as well as the unloading and storage of the materials. The Geosynthetics Contractor may be the GW Contractor or a subcontractor to the GW Contractor.

d. Construction Quality Assurance (CQA) Contractor: The contractor who is independent of the GW Contractor and is responsible for all CQA work.

e. CQA Geosynthetics Inspector: An inspector who works for the CQA Contractor and is responsible for inspection of the Geosynthetic Contractor’s work.

f. Synthetic Turf Manufacturer: The manufacturer who is responsible for manufacture of synthetic turf materials and for transporting synthetic turf materials to the site.

g. Watershed Geo: A geosynthetic technology company and the designer of the ClosureTurf® final cover system.

101.4 Qualifications:

a. Synthetic Turf Manufacturer:

a1. The Synthetic Turf Manufacturer shall be approved by the Owner.

b. Geosynthetics Contractor:

b1. The Geosynthetics Contractor shall meet the qualifications for the Geosynthetics Contractor specified in Section 319022.

b2. The Geosynthetics Contractor shall be approved by the Synthetic Turf Manufacturer for installation of the Synthetic Turf Manufacturer's products.

b3. Synthetic Turf Seamers:

b3.1 Master Synthetic Turf Seamer shall have installed at least 5,000,000 square feet of geotextile materials.

b3.2 All other synthetic turf seamers shall have installed at least 1,000,000 square feet of geotextile materials. Personnel who do not meet this criterion may be allowed to seam synthetic turf panels but only under the direct supervision of the Master Synthetic Turf Seamer.

b3.3 Personnel performing fusion welding of synthetic turf panels shall be factory trained by Demtech Services, Inc.

102. <u>RELATED WORK SPECIFIED IN OTHER SECTIONS AND SPECIFICATIONS</u>

102.1 The work specified in this section shall be coordinated with work specified in the following related sections and specifications:

a. GW Specification W-9100:

a1. Section 319022 – High Density Polyethylene Geomembrane Liner for Final Cover System.

b. CQA Specification W-9101:

b1. Section 014362 – Construction Quality Assurance for Closing a CCR Surface Impoundment.

103. <u>REFERENCE DOCUMENTS</u>

103.1 Standards, Specifications, manuals, codes and other publications of nationally recognized organizations and association are referenced herein. Methods, equipment, and materials specified herein shall comply with the specified and applicable portions of the referenced documents, in addition to federal, state, or local agencies having jurisdiction.

103.2 References to these documents are to the latest issue date of each document, unless otherwise indicated, together with the latest additions, addenda, amendments, supplements, etc., thereto, in effect as of the date of Contract for the Work.

103.3 Abbreviations listed indicate the form used to identify the reference documents cited in this section.

103.4 ASTM – ASTM International:

a.	C128	Standard Test Method for Relative Density (Specific Gravity) and Absorption of Fine Aggregate.
b.	C136	Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
c.	C1252	Standard Test Methods for Uncompacted Void Content of Fine Aggregate (as Influenced by Particle Shape, Surface Texture, and Grading).
d.	D1557	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 (2,700 kN-m/m^3)).
e.	D2256	Standard Test Method for Tensile Properties of Yarns by the Single-Strand Method.
f.	D4595	Standard Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method.
g.	D4884	Standard Test Method for Strength of Sewn or Thermally Bonded Seams of Geotextiles.
h.	D5261	Standard Test Method for Measuring Mass per Unit Area of Geotextiles.
i.	D5321	Standard Test Method for Determining the Shear Strength of Soil-Geosynthetic and Geosynthetic-Geosynthetic Interfaces by Direct Shear.
j.	D6241	Standard Test Method for the Static Puncture Strength of Geotextiles and Geotextile-Related Products Using a 50mm Probe.
k.	D6459	Standard Test Method for Determination of Rolled Erosion Control Product (RECP) Performance in Protecting Hillslopes from Rainfall-Induced Erosion
l.	G147	Standard Practice for Conditioning and Handling of Nonmetallic Materials for Natural and Artificial Weathering Tests.
m.	G154	Standard Practice for Operating Fluorescent Ultraviolet (UV) Lamp Apparatus for Exposure of Nonmetallic Materials.

104. SUBMITTALS

104.1 GW Contractor shall submit the following drawings and data as specified. GW Contractor's drawings and data shall be submitted via electronic medium in a format compatible for importing into Owner's information systems (as specified by the Owner).

104.2 Submittals with Bid Proposal:

a. Resumes of key Geosynthetics Contractor personnel demonstrating Geosynthetics Contractor meets qualifications specified in Paragraph 101.4 of this section.

b. Synthetic Turf Material:

b1. Synthetic Turf Manufacturer's literature providing specifications on the synthetic turf material that will be supplied.

b2. Synthetic Turf Manufacturer's certification that synthetic turf materials to be supplied comply with the requirements of this Specification.

b3. Manufacturer's Quality Control (MQC) and Construction Quality Control Plans. The MQC plan shall include inspection records of the tufting procedures and indicate the following material properties for every 300,000 square feet of synthetic turf manufactured:

b3.1 Tufting gauge.

b3.2 Pile height.

b3.3 Roll length and roll numbers.

b3.4 Total product weight.

b3.5 CBR puncture per ASTM D6241.

b3.6 Tensile strength product (lb. / ft, minimum average roll value) per ASTM D4595.

b3.7 Tensile strength of yarn (lbs., minimum average roll value) per ASTM D2256.

c. Ballast Infill Material:

c1. Proposed construction equipment and method(s) to be used to install Ballast Infill material.

104.3 Submittals After Award of the Contract:

a. Synthetic Turf Material:

a1. Synthetic turf material samples for conformance testing as specified in Specification W-9101, Section 014632.

b. Ballast Infill Material:

b1. GW Contractor shall submit a 10-pound sample of Ballast Infill material to the Synthetic Turf Manufacturer.

b2. Ballast Infill material samples for conformance testing as specified in Specification W-9101, Section 014632.

105. <u>QUALITY ASSURANCE</u>

105.1 Materials and construction procedures shall be subject to inspection and testing by the CQA Contractor employed by the Owner. Such inspections and tests will not relieve the GW Contractor of responsibility for providing materials and installation in compliance with specified requirements.

105.2 The Owner reserves the right, at any time before final acceptance, to reject materials or workmanship not complying with specified requirements. The GW Contractor shall correct the deficiencies which the inspections and tests have indicated are not in compliance with specified requirements.

105.3 CQA activities for installing the engineered synthetic turf shall be performed as described herein and in Specification W-9101.

PART 2 - PRODUCTS

201. SYNTHETIC TURF MATERIALS

201.1 Acceptable Manufacturers:

a. The products of the following manufacturers meeting the requirements for synthetic turf herein are acceptable:

a1. Watershed Geo and their supplier Shaw Industries, Inc., 616 E. Walnut Avenue, Dalton, GA 30720, Tel.: 800-720-7429.

a2. Owner-approved equal.

201.2 Material Requirements:

a. Synthetic turf materials shall meet the requirements of Table 311522-1.

TABLE 311522-1

MINIMUM REQUIREMENTS FOR SYNTHETIC TURF MATERIALS

Property	Test Method	Specified Value
Yarn Type	N/A	Polyethylene
Yarn Color	N/A	TBD
Yarn Weight	ASTM D5261	20 oz. / sq. yd (min.)
Total Synthetic Turf Weight	ASTM D5261	32 oz. / sq. yd (min.)
Tensile Strength of Yarn	ASTM D2256	15 lbs. (min.)
CBR Puncture	ASTM D6241	1,500 lbs. (MARV)
Tensile Product:	ASTM D4595	
• Machine Direction		2,100 lb. / ft (MARV)
• Cross Direction		1,600 lb. / ft (MARV)
Interface Friction:	ASTM D5321	
• Between Synthetic Turf and 60 mil HDPE Textured Geomembrane		21° Peak (min.)
• Between Synthetic Turf and 60 mil HDPE Structured Geomembrane		35° Peak (min.)
Turf Fiber UV Stability	ASTM G147	60% (min.) retained tensile strength at 100 yrs (projected)
Geotextile Backing UV Stability (Exposed)	ASTM G154 Modified Cycle 1, UVA340	110 lb./ft retained tensile strength at 6,500 hrs (projected)
Aerodynamic Evaluation	GTRI Wind Tunnel	120 mph with max. uplift of 0.12 lb. / sq. ft
Rainfall Induced Erosion	ASTM D6459	Infill Loss 0.1% at 6 in./hr Rainfall

201.3 Packaging and Shipping Requirements:

a. Packaging and transportation shall be the responsibility of the Synthetic Turf Manufacturer, who shall retain responsibility until the synthetic turf is accepted at the site by the Geosynthetics Contractor.

b. Packaging:

b1. Deliver synthetic turf materials to the project site in rolls, each wrapped securely with a protective covering installed at the manufacturing facility. The covering shall prevent the entrance of water, vermin, and dirt, and shall be adequate for protection against ultraviolet exposure.

b2. The packaging shall not interfere with handling of the rolls either by slings or by using the central core upon which the synthetic turf is wound.

b3. A label shall be attached or adhered to each roll of synthetic turf identifying the following:

b3.1 Synthetic Turf Manufacturer’s name.

b3.2 Product identification.

b3.3 Date of manufacture of the synthetic turf.

b3.4 Lot number.

b3.5 Roll identification number.

202. BALLAST INFILL MATERIALS

202.1 Acceptable Ballast Infill Material:

a. Material used as Ballast Infill between the tufts of the synthetic turf shall meet the final aggregate angularity, specific gravity, and grain size distribution specified in Table 311522-2.

TABLE 311522-2

REQUIREMENTS FOR BALLAST INFILL MATERIALS

Property	Test Method	Specified Value	
Uncompacted Void Content	ASTM C1252 Method A	40% min.	
Bulk Oven-Dry Specific Gravity	ASTM C128	2.40 min.	
Grain Size Distribution	ASTM C136	Sieve Size	Percent Passing
		3/8”	100
		#4	90 – 100
		#8	50 – 85
		#16	25 – 65
		#30	10 – 45
		#50	0 – 30
		#100	0 – 10
		#200	0

PART 3 - EXECUTION

301. ONSITE HANDLING AND STORAGE

301.1 Receipt/Unloading:

a. Upon delivery of the materials to the project site, the unloading and other handling of synthetic turf materials shall be performed by the Geosynthetics Contractor and in a manner to ensure the material is handled with care and is not damaged.

b. Any protective covering that is accidentally damaged or stripped off of a roll shall be immediately repaired or the roll shall be moved to an enclosed facility until the repair can be made.

301.2 Storage:

a. The on-site storage space near the work area where the synthetic turf will be placed shall be managed by the GW Contractor such that on-site transportation and handling are minimized.

b. Rolls of synthetic turf shall be placed on a smooth surface free of rocks and standing water.

c. Rolls of synthetic turf shall be stored in such a manner that cores are not crushed, the geotextile not damaged, and as required to provide protection from exposure to ultraviolet light, inundation, mud, dirt, dust, puncture, cutting, or any other damaging or deleterious condition. If stacked, the rolls shall be stacked per the Synthetic Turf Manufacturer’s recommendations, but no more than three rolls high.

301.3 Inspection:

a. Upon delivery of the materials to the project site, the Synthetic Turf Contractor shall conduct a visual inspection of all rolls of synthetic turf for damage or defects. This inspection shall be done without unrolling any rolls unless damage to the inside of a roll is found or suspected.

b. Any damage or defects shall be noted and immediately reported to the Synthetic Turf Manufacturer and Owner. Any roll, or portion thereof, which, in the judgment of Owner or Owner’s Representative, is seriously damaged, shall be removed from the project site and replaced with complying material at no additional cost to Owner.

302. PRE-DEPLOYMENT OF SYNTHETIC TURF COVER

302.1 The geomembrane component of the ClosureTurf® final cover system shall be placed, seamed, tested, and approved in accordance with Section 319022 prior to deploying the synthetic turf component.

302.2 The geomembrane surface shall be substantially free of debris, large scraps, *etc*.

303. FIELD PLACEMENT OF SYNTHETIC TURF COVER

303.1 General Requirements:

a. The Synthetic Turf Contractor shall not remove the protective covering from the synthetic turf rolls to be deployed until immediately prior to deployment to ensure that synthetic turf panels are not excessively exposed to ultraviolet degradation.

b. During handling, the synthetic turf panels shall be handled in such a manner that the material is not damaged in any way. Damaged material shall not be used.

303.2 Panel Deployment:

a. Synthetic turf panels shall not be deployed until the CQA Contractor has inspected the surface of the geomembrane in accordance with Specification W-9101. Any synthetic turf panels deployed over areas not accepted by the CQA Contractor shall be removed to allow inspection at no cost to Owner or CQA Contractor.

b. All necessary precautions shall be taken to prevent damage to the underlying geomembrane upon which the synthetic turf is to be placed.

c. All personnel working on the geomembrane surface shall wear soft-soled shoes and shall not engage in any activity which may damage the geomembrane.

d. Except for seam welding machinery or All-Terrain Vehicles (ATV) approved for use by the Design Engineer in writing, machinery shall not be operated on the geomembrane.

e. The use of ATVs for the deployment of the synthetic turf and Ballast Infill material will be allowed. For ATVs to be used, the Contractor must demonstrate that the ATV exerts a maximum allowable pressure on the geomembrane or synthetic turf surface of 5 psi. The maximum allowable pressure on the geomembrane surface or synthetic turf is influenced by the tread pattern of the tires on the ATV. The maximum allowable pressure is not the reading from a tire pressure gauge. The ATVs shall only be used to deploy rolls of synthetic turf and Ballast Infill material and shall not be used to transport personnel, equipment, sandbags, or the like.

f. Deployment of synthetic turf panels on slopes shall proceed as follows:

f1. The synthetic turf shall be securely anchored at the top and then rolled down the slope in such a manner as to continually keep the panel in tension and keep the panel free of wrinkles and folds.

f2. The first synthetic turf panel deployed shall have the turf filaments facing upward.

f3. If the synthetic turf panels will be spliced by sewing, subsequent panels shall be deployed turf side down and on top of the previous panel. After sewing each panel, the panel shall be flipped onto the geomembrane surface with care to avoid pulling tufts in the drainage studs.

f4. The turf filaments in all synthetic turf panels shall be pointing upslope after deployment is complete.

g. Synthetic turf panels shall only be cut using an upward cutting hook blade. If synthetic turf panels are cut in place, special care shall be taken to protect the underlying geomembrane from damage which could be caused by cutting the synthetic turf panels.

h. Any damage or suspected damage to the geomembrane during deployment, cutting or seaming of synthetic turf shall immediately be identified to the CQA Contractor and the Owner. No work shall proceed in the area until the potential damage is evaluated, documented and repaired as necessary.

i. During placement of synthetic turf panels, care shall be taken not to entrap, in or beneath the synthetic turf, stones, excessive dust, or moisture that could damage the synthetic turf or underlying geomembrane, or hamper subsequent splicing.

j. All deployed synthetic turf panels shall be weighted with sandbags, old tires, or the equivalent to provide resistance to wind uplift. Such weights shall be installed during deployment and shall remain until the sand infill is placed. Uplifted material can be reused only if approved by Owner.

303.3 Field Splicing:

a. Method of Splicing:

a1. Successive panels of synthetic turf shall be continuously sewn (i.e., spot seaming is not allowed) or continuously heat bonded in accordance with Synthetic Turf Manufacturer's recommendations on slopes flatter than 10H:1V (10 percent).

a2. On slopes steeper than 10H:1V (10 percent), all successive panels of synthetic turf shall be continuously sewn (i.e., spot sewing and heat bonding are not allowed). All seams shall be vertical (parallel with the flow line of the slope). No horizontal seams (across the slope) shall be permitted.

b. Sewing:

b1. Sewing procedures shall conform to the latest procedures recommended by the Synthetic Turf Manufacturer.

b2. Sewing shall be done using 207 polyester sewing thread.

b3. Seams shall be "prayer" seams constructed using a Newlong sewing machine or Owner-approved equal. Seams shall be formed by mating the edges of the synthetic turf panels and sewing the panels together with continuous stitches located between the first and second rows of tufts on both sides of the synthetic turf panels.

c. Heat Bonding:

c1. Fusion seaming (heat bonding) shall be performed using a Demtech VM-20/4/A fusion welder only.

c2. Fusion seams shall be made with at least 5 inches of overlap between the synthetic turf panels being welded.

c3. Frayed or loosed geotextile strands shall be cut off or otherwise removed.

c4. Prior to starting production seaming, trial seams shall be performed per Paragraph 303.3d of this section.

c5. Mechanical or hot knife trimming and cutting devices shall be utilized for salvage trimming.

c6. Any damage that occurs due to production seaming shall be repaired in accordance with the Synthetic Turf Manufacturer's recommendations.

d. Trial Welds Prior to Beginning Heat Bonding:

d1. Trial welds are required for pre-qualification of personnel, equipment, and procedures for making seams on identical geotextile material under the same climatic conditions as the actual field production seams will be made.

d2. Trial welds shall be made as follows:

d2.1 Prior to each seaming period.

d2.2 Every 4 hours (*i.e.*, at the beginning of the work shift and after the lunch break).

d2.3 Whenever personnel or equipment are changed.

d2.4 When the welding apparatus has been turned off for longer than 30 minutes.

d2.5 When climatic conditions result in wide changes in geotextile temperature.

d2.6 When requested by the CQA Geosynthetic Inspector for any seaming crew or piece of welding equipment if problems are suspected.

d3. Once qualified by passing a trial weld, welding technicians shall not change parameters without performing another trial weld.

d4. A test strip shall be prepared by joining two pieces of synthetic turf. The test strip shall be at least 12 inches wide and 3 feet long, and the seam shall be centered lengthwise. The CQA Geosynthetic Inspector shall witness the fabrication of each test strip.

d5. Testing of a trial weld shall not commence until the seam cools to the ambient temperature.

d6. Trial Weld Testing Procedure and Pass/Fail Criteria:

d6.1 Trial welds shall comply with visual passing criteria, which is verified when manual peel/pull test is performed, and the top synthetic turf panel tufts transfer to the bottom synthetic turf panel.

d6.2 Passing Test: 75% or more of the tufts in the top synthetic turf panel transfer to the bottom synthetic turf panel.

d6.3 Failing Test: Less than approximately 75% of the tufts in the top synthetic turf panel transfer to the bottom synthetic turf panel.

d6.4 Two consecutive trial welds shall meet the visual passing criteria above prior to commencing production seaming.

304. REPAIR OF SYNTHETIC TURF

304.1 Repair of Holes or Tears:

a. All holes or tears in a synthetic turf panel shall be repaired by using a heat-bonded seam. A handheld heat gun with a pressure wheel shall be used in smaller, concentrated areas.

b. The patch material shall be the same synthetic turf material as the damaged synthetic turf panel.

c. Care shall be taken to remove any soil, object, and/or other material which penetrated or tore the synthetic turf.

d. Alternative patching techniques may be utilized by the Geosynthetics Contractor following a field demonstration and subsequent approval by Owner.

305. INSPECTION OF SYNTHETIC TURF COVER AFTER INSTALLATION:

305.1 After installation is complete, a visual examination of the synthetic turf shall be carried out over the entire surface of the synthetic turf to verify that no potentially harmful foreign objects, such as broken needles, are present.

305.2 When sewing seams, the Geosynthetics Contractor shall perform continuous inspection during the seaming process using an in-line metal detector with an adequate sweep rate to determine the presence of broken needles. If the presence of broken needles is indicated, a needle removal system using magnets shall be implemented.

306. <u>PLACEMENT OF BALLAST INFILL:</u>

306.1 Placement of Ballast Infill between the tufts of the synthetic turf shall be done within the time limit specified by the Synthetic Turf Manufacturer.

306.2 Placement Procedures:

a. Ballast Infill shall be spread and placing using conveyor systems and/or express blowers using the method(s) presented to the Owner by the Ballast Infill Installer during the pre-construction meeting.

b. Ballast Infill shall not be deployed when snow and/or ice are present on the synthetic turf.

c. Ballast Infill shall be deployed in such a manner that excessive tensile stress is not placed on the synthetic turf.

d. Placement of the Ballast Infill shall be done in such a manner that the ClosureTurf® components are not shifted from their intended positions and are not exposed or damaged. On slopes, this requires deployment of Ballast Infill material to proceed from the bottom of the slope upward.

306.3 Final Thickness:

a. Ballast Infill placed between the tufts of the synthetic turf shall be at least 0.5-inch thick but no more than 0.75-inch thick.

END OF SECTION 311522

SECTION 312205

EARTHWORK FOR CCR SURFACE IMPOUNDMENT CLOSURE

PART 1 - GENERAL

101. EXTENT

101.1 This section defines the material and installation requirements for earthwork as part of closing Ponds 1N, 1S, 2S, and 3S at the Will County Generating Station. This work shall be performed in accordance with the Design Drawings and as specified herein. This design is compliant with the Illinois and U.S. EPA Coal Combustion Residual (CCR) Rules.

101.2 The Work shall include, but not be limited to, the following items as indicated:

a. Surveying for alignment and grade.

b. Furnishing and installing sediment and erosion control best management practices (BMPs) prior to construction and maintaining these BMPs during construction.

c. Demolition and disposal of waste.

d. Clearing, grubbing, and topsoil stripping, with offsite disposal of organic debris and waste.

e. Preparation of the subgrade (CCR) to receive Structural Fill or final cover system materials.

f. Grading of CCR material along with placement and compaction of Structural Fill to support the final cover system.

g. Excavating anchor trenches where indicated on the Design Drawings.

h. Placing fill materials over run-outs and in crest anchor trenches for geosynthetic materials.

i. Placing crushed stone to re-surface existing roads on top of pond dikes where indicated on the Design Drawings.

j. Disposal of excess or unsuitable excavated material if required.

k. Dust control.

102. RELATED WORK SPECIFIED IN OTHER SECTIONS AND SPECIFICATIONS

102.1 The work specified in this section shall be coordinated with work specified in the following related sections and specifications:

a. GW Specification W-9100:

a1. Section 319022 – High Density Polyethylene Geomembrane for Final Cover System.

b. CQA Specification W-9101:

b1. Section 014362 – Construction Quality Assurance for Closing a CCR Impoundment.

103. REFERENCE DOCUMENTS

103.1 Standards, Specifications, manuals, codes, and other publications of nationally recognized organizations are referenced herein. Methods, equipment, and materials specified herein shall comply with the specified and applicable portions of the referenced documents, in addition to federal, state, or local agencies having jurisdiction.

103.2 References to these documents are to the latest issue date of each document, unless otherwise indicated, together with the latest additions, addenda, amendments, supplements, etc., thereto, in effect as of the date of Contract for the Work.

103.3 Abbreviations listed below indicate the form used to identify the reference documents cited in this section.

103.4 ASTM – ASTM International:

a. D422 Standard Test Method for Particle-Size Analysis of Soils (Withdrawn 2016).

b. D1140 Standard Test Methods for Determining the Amount of Material Finer than 75-µm (No. 200) Sieve in Soils by Washing.

c. D1557 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 (2,700 kN-m/m^3)).

d. D2487 Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System).

e. D4253 Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table.

f. D4254 Standard Test Methods for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density.

g. D4318 Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

103.5 IDOT – Illinois Department of Transportation:

a. Standard Specifications for Road and Bridge Construction (Adopted January 1, 2022).

103.6 ITP – Illinois Test Procedure:

a. 27 Sieve Analysis of Fine and Coarse Aggregates.

b. 96 Resistance by Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.

c. 104 Soundness of Aggregate by Use of Sodium Sulfate.

104. SUBMITTALS

104.1 The GW Contractor shall submit drawings and data as specified. GW Contractor's drawings and data shall be submitted via electronic medium in a format compatible for importing into the Owner's information systems (as specified by the Owner).

104.2 Submittals with Bid Proposal:

a. Catalog data on all compaction equipment and proofrolling equipment the Earthwork Contractor plans to use on the project.

104.3 Submittals After Award:

a. Structural Fill Material:

a1. At least 30 days prior to scheduled delivery, the Earthwork Contractor shall submit certificates for the Structural Fill material signed by the supplier or a qualified geotechnical engineering consultant that certify the following items comply with or exceed specifications for the material:

Property		Standard(1)	Data Required
a1.1	Sieve Analysis	ASTM C136	Percent Passing Selected Sieves
a1.2	Classification of Material	ASTM D2487	Classification
a1.3	Organic Content	ASTM D2974	Percent of Organic Material
a1.4	Atterberg Limits(2)	ASTM D4318	Liquid Limit and Plasticity Index

Note:

(1) Test results shall be provided on two random samples taken from each borrow area. If processing of borrow area material is required to meet material specifications, the tests shall be performed on the process material.

(2) Atterberg limits are only required if cohesive/fine grained materials are to be used for Structural Fill.

b. Crushed Stone Surfacing for Roads:

b1. At least 30 days prior to scheduled delivery, the Earthwork Contractor shall submit certificates for the crushed stone material to be used to re-surface the existing roads on top of the pond dikes, which shall be signed by the supplier or a qualified geotechnical engineering consultant certifying the following items comply with or exceed specifications for the material:

Property		Standard(1)	Data Required
b1.1	Sieve Analysis	ITP 27	Percent Passing Selected Sieves
b1.2	Na2SO4 Soundness 5 Cycle	ITP 104	Percent Loss Max.
b1.3	Los Angeles Abrasion	ITP 96	Percent Loss Max.
b1.4	Minus No. 200	ITP 11	Percent Passing No. 200
b1.5	Deleterious Materials	ITP 203	Percent Loss Max.
b1.6	Oil-Stained Aggregate	ITP 203	Percent Loss Max.

Note:

(1) Test results shall be provided on two random samples taken from each borrow area. If processing of borrow area material is required to meet material specifications, the tests shall be performed on the process material.

105. QUALITY ASSURANCE

105.1 Material and construction procedures are subject to inspection and testing by the CQA Contractor hired by the Owner. Such inspections and tests shall not relieve the Earthwork Contractor of responsibility for providing material and placement in compliance with specified requirements.

105.2 The Owner reserves the right, at any time before final acceptance, to reject material not complying with the specified requirements. The Earthwork Contractor shall correct all deficiencies which inspections, laboratory tests, or field tests have indicated are not in compliance with the specified requirements. The Earthwork Contractor shall perform additional tests, at their expense, as may be necessary to reconfirm any noncompliance of the original Work, and as may be necessary to show compliance of corrected Work.

105.3 The Earthwork Contractor shall promptly correct errors or flaws in the Work or material identified during construction which may prevent proper installation. The Earthwork Contractor shall make immediate substitution of the noncomplying material or shall make field changes to make the noncomplying material acceptable. The correction or substitution shall be performed at no cost to Owner.

105.4 CQA activities shall be performed as described herein and in Specification W-9101.

PART 2 - PRODUCTS

201. MATERIALS FOR STRUCTURAL FILL

201.1 Definitions:

a. Structural Fill is fill placed in the ash ponds to support the ponds' final cover system as identified on the Design Drawings.

201.2 Satisfactory Material:

a. Granular Material:

a1. Granular material for use as Structural Fill shall be rounded and not crushed with less than one percent organic or other deleterious material, free of excess moisture, and a maximum particle size less than one inch.

a2. Acceptable granular materials are soils which are classified as coarse-grained soils in the Unified Soil Classification System, ASTM D2487. Classifications are GW, GP, GC, SW, SP, or SC, or a combination of these such as SP-SC.

a3. No material with a silt content greater than 12 percent (i.e., SM or GM) shall be used for Structural Fill.

b. Cohesive Fill:

b1. Cohesive material is suitable for use as Structural Fill if it contains not more than two percent organic or other deleterious material, has a maximum particle size of one inch, has a liquid limit of less than 45, and has a plasticity index of less than 25.

b2. Acceptable cohesive materials are soils which are classified as fine-grained soils in the Unified Soil Classification System, ASTM D2487. Classification is CL.

201.3 Unsatisfactory Material:

a. Material unsatisfactory for use as Structural Fill beneath final cover system is as follows:

a1. Soils classified as silt or organic soils in the Unified Soil Classification System, ASTM D2487. Classifications are ML, MH, PT, OL and OH.

a2. Soils classified as high liquid limit clay soils in the Unified Soil Classification System, ASTM D2487. Classification is CH.

a3. Soils classified as CL-ML (plasticity index of 4 to 7) in the Unified Soil Classification System, ASTM D2487.

a4. Rock material without a soil matrix in which nesting of rocks could occur.

a5. Uncontrolled fill.

a6. Debris.

201.4 Material Sources:

a. Coarse aggregate material from Owner's onsite stockpile may be used as Structural Fill provided the material is screened as necessary to meet the requirements for satisfactory material in accordance with Paragraph 201.2a. No angular particles shall be present within 12 inches from the top-of-structural fill surface shown on the Design Drawings (i.e., final cover system subgrade).

b. If sufficient quantities of coarse aggregate for Structural Fill are not available in Owner's onsite stockpile, the balance of Structural Fill material shall be obtained from an offsite borrow source identified by the Earthwork Contractor and approved by the Owner.

202. <u>CCR FILL:</u>

202.1 The existing CCR stored in Ponds 1N, 1S, 2S and 3S may be used as Structural Fill to support the pond's final cover system but is not permitted to be used as fill beyond the limits of the ponds' existing liners. There are no restrictions on the use of CCR within the limits of the ponds' existing liners. CCR shall not be transferred between ponds.

202.2 CCR shall not be taken offsite and shall be graded solely for the purpose of establishing the proper slopes for drainage of the final cover system and/or to support Structural Fill used to establish the lines and grades for the final cover system.

203. <u>ROAD SURFACING:</u>

203.1 Material for surfacing permanent roads above the final cover system shall be obtained from Owner's onsite stockpile of coarse aggregate material.

203.2 If sufficient quantities of coarse aggregate for road surfacing material are not available in Owner's onsite stockpile, the balance of road surfacing material shall be obtained from an offsite borrow source identified by the Earthwork Contractor and approved by the Owner. Road surfacing material obtained from an offsite borrow source shall be Class A or B CA 6 in accordance with Article 1004.04 of the IDOT Standard Specifications for Road and Bridge Construction.

204. <u>RESTRICTIONS ON THE USE OF MATERIAL FOR ANY PURPOSE</u>

204.1 Any material, which is frozen, contains an excessive amount of organic material or trash, or contains rocks larger than 2 inches, shall be considered unsatisfactory for use as fill.

204.2 Fill and backfill soils placed by previous construction shall be considered unsatisfactory for use as fill unless they meet the requirements for satisfactory material.

PART 3 - EXECUTION

301. <u>GENERAL</u>

301.1 The work required is shown on the Design Drawings. No work shall be performed outside of the designated area without prior written approval of the Owner.

301.2 All work that is incidental to excavation or fill may not be specifically indicated on the Design Drawings, but shall be performed as part of the Work.

302. CLEARING, GRUBBING, AND TOPSOIL STRIPPING

302.1 All vegetation within areas to be excavated or to receive fill shall be cleared and grubbed, stripped of topsoil and debris, and shall have been inspected and approved by the CQA Contractor prior to beginning earth-moving operations.

302.2 Weeds, small roots, heavy grass, and other vegetation remaining after clearing and grubbing operations shall be removed with the topsoil.

302.3 Special care shall be taken to avoid damage to the ponds' existing liners where organic material or topsoil are adjacent to or immediately above the liners.

302.4 Disposal:

a. Stripped topsoil shall be hauled offsite at a permanent disposal facility approved by the Owner that is permitted to receive CCR waste.

303. DEMOLITION

303.1 Demolition of any structure, if required, will be shown on the Design Drawings.

303.2 Demolition and removal of minor items which are incidental to the earthwork may be required. The GW Contractor shall identify any such items during its prebid walkdown. The GW Contractor shall demolish such items as required as part of the performance of the Work.

303.3 All waste resulting from demolition work shall be disposed of by the Earthwork Contractor in an offsite disposal area approved by the Owner.

304. EXCAVATION

304.1 CCR Excavation:

a. Excavations of CCR materials within the limits of Ponds 1N, 1S, 2S, and 3S shall be performed to the lines and grades indicated on the Design Drawings.

b. Excavated material shall be used for fill unless it is classified as unsatisfactory.

c. CCR and CCR-mixed materials stored in Ponds 1N, 1S, 2S, and 3S shall be excavated and used as fill using proper placement and compaction methods specified herein. Under no circumstances shall CCR and CCR-mixed materials be used as fill in areas outside of the limits of the ponds' existing liners.

d. GW Contractor shall take all appropriate measures to protect the existing liners during excavation activities. Any damage to the existing liner materials caused by the GW Contractor shall be repaired by GW Contractor at no cost to Owner.

e. Excavations shall not be carried below grades indicated on the Design Drawings without approval of Owner. Overexcavations shall be refilled with compacted Structural Fill to the proper grade at no additional cost to Owner.

304.2 Excavation of Drainage Facilities:

a. Drainage ditches, swales, and channels shall be cut accurately to the cross section and grades indicated on the Design Drawings.

b. Roots, stumps, rocks and foreign material in the sides and bottom of drainage facilities shall be removed and the facility trimmed and dressed.

c. Care shall be taken not to excavate ditches and channels below the grades indicated. Excessive excavation shall be backfilled with compacted Structural Fill material at no additional cost to the Owner.

d. Drainage facilities shall be maintained until final acceptance of the Work by the Owner.

e. Material excavated from the drainage facilities shall be used as fill or transported to the designated offsite disposal area.

305. DISPOSAL OF EXCESS MATERIAL

305.1 Disposal of Unsatisfactory Material:

a. Excavated material, which is unsatisfactory for use as fill shall be disposed of in an offsite landfill permitted to receive CCR and approved by the Owner. Unsatisfactory fill material shall not be mixed with satisfactory fill material.

b. When transporting CCR and/or CCR-mixed materials offsite, the GW Contractor shall responsibly handle and transport the material in accordance with 35 Ill. Adm. Code 845.740(c)(1).

306. PREPARATION OF EXISTING SUBGRADE (CCR) TO RECEIVE FINAL COVER SYSTEM

306.1 Subgrade Compaction and Proofroll:

a. Where an existing liner is at least 2 feet below subgrade, the subgrade beneath areas to receive fill shall be compacted and proofrolled prior to placing the fill. The subgrade shall be compacted to the minimum degree of compaction specified in Table 312205-1. Proofrolling shall consist of furnishing and operating compaction equipment for testing the stability of subgrade prior to receiving the fill. The intent is to locate any unstable areas. Proofrolling shall be performed in the presence of the CQA Contractor to allow for observation of unstable areas.

b. Where an existing liner is less than 2 feet below subgrade, subgrade preparation and testing are not required nor shall they be performed.

c. Compact the surface of the subgrade to achieve the required density prior to performing proofroll.

d. Equipment such as a fully loaded water wagon having a gross weight of not less than 25 tons or loaded dump truck weighing at least 25 tons shall be used for proofrolling

e. Proofroll the surface by making a minimum of two coverages with the approved equipment at a speed no greater than 3 mph. Each succeeding trip of the proofroller shall be offset by not greater than one tire width. Make additional passes over areas of suspected instability.

f. Failure: The subgrade shall be considered failed if, under the action of proofrolling, the subgrade yields, pumps, or is otherwise unstable. Yielding is defined as rutting of more than 1 inch measured from the top of the construction grade to the bottom of the rut.

g. Remedial Action: Either moisture condition, scarify, and recompact failed areas or remove all failed areas a minimum depth of one foot or as directed by the Owner and replace with satisfactory fill compacted as specified for Structural Fill.

307. PLACEMENT OF STRUCTURAL FILL

307.1 Lift Thickness:

a. Fill shall be placed in horizontal layers.

b. Unless otherwise approved by Owner, the loose thickness shall not exceed the following:

b1. Eight inches maximum loose lift thickness for compaction by self-propelled equipment.

b2. Four inches maximum loose lift thickness for compaction by hand-operated equipment.

b3. These lift thicknesses may be increased if the results of a test section prove that a thicker loose lift can be compacted to the required specified densities. The maximum loose lift thickness shall be 12 inches.

307.2 Placement:

a. Where fill is placed with less than 2 feet of separation from an existing liner, care shall be taken to avoid any damage to the existing liner system. This includes placing fill against the existing dikes from the bottom up while maintaining adequate fill thickness to prevent damage to the existing liner system.

b. Each layer of fill shall be evenly spread and moistened or aerated as required to achieve the required moisture content.

c. The top surface of each layer shall be approximately level but shall have sufficient crown or cross fall to provide adequate drainage of water at all times during the construction period. The crown or crossfall shall be at least 1 in 50 (two percent) but no greater than 1 in 20 (five percent).

d. Fill slopes steeper than 20 percent (i.e., five horizontal to one vertical) shall be overfilled a minimum of 6 inches beyond the face of the slope, measured horizontally, and then cut back and trimmed to the required line and grade to expose a smooth surface uniformly compacted to the required density. Installing the fill slope to lines and grades shown on the design drawings and then running over the surface with compaction equipment is not acceptable.

308. COMPACTING STRUCTURAL FILL

308.1 Equipment:

a. Each layer of fill shall be compacted by a smooth drum vibratory roller or other mechanical means acceptable to Owner that will produce the specified compaction.

b. At locations where it would be impractical because of inaccessibility to use self-propelled compacting equipment, fill layers shall be compacted using hand propelled compaction equipment.

308.2 Inspection and Testing:

a. All Work is subject to inspection and testing by the CQA Contractor. The CQA Contractor shall have access to the Work at all times. Testing shall be in accordance with the Contract. Refer to Specification W-9101 for inspection and testing requirements.

b. Each layer of compacted fill shall be tested and accepted before proceeding with the next layer.

c. It is the GW Contractor’s responsibility to request inspection prior to proceeding with further work that would make parts of the Work inaccessible for inspection.

d. If the fill material fails to meet the required density, the material shall be removed and replaced or reworked, altering the construction method as necessary to obtain the required density and compaction. Sufficient time shall be allotted between lifts for the necessary testing of the soils.

309. COMPACTION DENSITIES

309.1 The degree of compaction shall be expressed as a percentage of the maximum laboratory dry density obtained at optimum moisture content in accordance with the standards listed in Table 312205-1.

309.2 The minimum degree of compaction for fills for different areas is presented in Table 312205-1. The GW Contractor shall use data from this table which are applicable to the project.

309.3 Provided GW Contractor can achieve the specified degree of compaction, moisture content of granular soils (e.g. poorly graded sand (SP), CCR, and IDOT CA 6) shall not be a sole basis for rejection of the compacted fill.

310. GRADING TOLERANCES

310.1 Lines and Grades: The acceptable deviation from lines and grades indicated on the Design Drawings shall be as shown in Table 312205-2. The GW Contractor shall use data from that table which is applicable to the project.

310.2 Slopes: Slopes shall be finished in conformance with the lines and grades shown on the Design Drawings. When completed, the average plane of a slope shall conform to the slope indicated on the Design Drawings, and no point on the completed slope shall vary from the designated plane by more than 6 inches measured at right angles to the slope.

311. DUST CONTROL

311.1 The GW Contractor shall be responsible for controlling dust caused by the grading operation in compliance with the Fugitive Dust Plan in place for the facility and in accordance with 35 Ill. Adm. Code 845.740(c)(2). The facility’s active Fugitive Dust Plan may be downloaded from https://midwestgenerationllc.com.

311.2 Water shall be applied uniformly and lightly to prevent muddy, slippery, or other hazardous conditions. The application shall be frequent enough to adequately control the dust nuisance. However, excessive application that would affect compacting operations shall be avoided.

312. TEMPORARY SEDIMENT CONTROL DURING CONSTRUCTION

312.1 The GW Contractor shall be responsible for providing temporary facilities for the control of sediment in site area runoff during construction.

312.2 Silt fences, straw bale dikes and other temporary facilities shall be provided as required and as specified on the Design Drawings.

313. EROSION CONTROL

313.1 The GW Contractor shall be responsible for temporary protection of graded areas against erosion and for correction of erosion, which occurs.

313.2 Slopes, ditches, or other disturbed areas shall not be exposed for more than 21 days without a permanent cover.

314. ANCHORAGE OF FINAL COVER SYSTEM MATERIALS

314.1 Anchor Trench Excavation and Shaping:

a. Where specified on the Design Drawings, anchor trenches shall be excavated by the Earthwork Contractor to the lines and widths shown on the Design Drawings prior to the Geosynthetics Contractor deploying the geomembrane component of the final cover system.

b. A slightly rounded corner shall be provided in the trench where the final cover system materials adjoin the trench to avoid sharp bends in cover components. The radius of rounding is shown on the Design Drawings. No loose soil shall be allowed to underlie the final cover system materials in the anchor trench.

c. Anchor trenches shall be adequately drained to prevent ponds or otherwise softening of the adjacent soils while the trenches are open.

314.2 Fill Placement Over Cover Run-Outs and in Anchor Trenches

a. The Earthwork Contractor shall place fill over cover run-outs or in an anchor trench after all final cover system materials are in place.

b. Fill placement over cover run-outs and in anchor trenches shall occur during the morning or during extended periods of overcast skies when the final cover system materials are at their most contracted states.

c. The first lift of fill placed above final cover system materials in an anchor trench may be 12 inches in thickness.

d. If compacted using hand-operated equipment, backfill shall be placed in lifts not exceeding 4 inches loose thickness and shall be compacted to a minimum of 95% of the maximum dry density as determined by ASTM D1557.

314.3 If compacted using self-propelled equipment, backfill shall be placed in lifts not exceeding 8 inches loose thickness and shall be compacted to a minimum of 95% of the maximum dry density as determined by ASTM D1557.

TABLE 312205-1

MINIMUM COMPACTION REQUIREMENTS

Area	ASTM D1557 (percent)
Subgrade (CCR)	
Subgrade Beneath Structural Fill / Final Cover System Materials	90
Structural Fills (Including Ash Fill)	
All Structural Fill	95

TABLE 312205-2

ACCEPTABLE DEVIATIONS FROM LINES AND GRADES ON DESIGN DRAWINGS

Type of Installation (Excavation or Fill)	Maximum Acceptable Deviation from Line (feet)	Maximum Acceptable Deviation from Grade(1) (feet)
General Earthwork		
General Site Area	±0.3	±0.2
Fill Areas Above Final Cover System (i.e., Permanent Road)	±0.3	+0.3 to -0.0
Drainage Facilities		
Permanent Drainage Channel	±0.3	+0.0 to -0.1
Slope Drainage Benches and Drainage Diversion Dikes	±0.5	±0.1

Notes:

(1) After initial settlement has taken place. Initial settlement is that settlement that will occur up to the time of determination and acceptance of final grade elevations by the Owner.

END OF SECTION 312205

SECTION 319022

HIGH DENSITY POLYETHYLENE GEOMEMBRANE FOR FINAL COVER SYSTEM

PART 1 - GENERAL

101. EXTENT

101.1 This section defines the minimum requirements for material and installation of textured high-density polyethylene (HDPE) geomembrane to be used in the ClosureTurf® final cover system (or Owner-approved equal) for Ponds 1N, 1S, 2S, and 3S, all in accordance with the Design Drawings and as specified herein.

101.2 The Work shall include, but not be limited to, the following items:

a. Manufacture, shipping, handling, and storage of geomembrane materials.

b. Inspection and approval of surfaces to be covered.

c. Placement and field seaming of geomembrane.

d. Anchorage of geomembrane using run-outs or anchor trenches as specified on the Design Drawings.

e. Attachment of geomembrane to concrete structures.

f. Non-destructive field testing of geomembrane seams.

g. Removal of samples of geomembrane seams and submittal to the CQA Contractor for destructive testing.

h. Repair of defective geomembrane seams.

i. Repair of defects in the geomembrane and locations where samples were taken.

j. Visual inspection of the completed geomembrane cover.

101.3 Definitions of Terms: The following definitions of terms shall apply throughout this section.

a. GW Contractor is contracted by and responsible to the Owner to perform all of the work specified herein. They may self-perform or subcontract the work. The final division of responsibilities between the Earthwork Contractor and Geosynthetics Contractor will be the responsibility of the GW Contractor.

b. Earthwork Contractor: The contractor who is generally responsible for earthwork for the facility and for excavation and backfill of anchor trenches. The Earthwork Contractor may be the GW Contractor or a subcontractor to the GW Contractor.

c. Geosynthetics Contractor: The contractor who is generally responsible for the supply and installation of all geomembrane and synthetic turf materials as well as the unloading and storage of the materials. The Geosynthetics Contractor may be the GW Contractor or a subcontractor to the GW Contractor.

d. Construction Quality Assurance (CQA) Contractor: The contractor who is independent of the GW Contractor and is responsible for all CQA work.

e. CQA Geosynthetics Inspector: An inspector who works for the CQA Contractor and is responsible for inspection of the Geosynthetics Contractor’s work.

f. Geomembrane Manufacturer: The manufacturer who is responsible for manufacture of geomembrane materials and for transporting geomembrane materials to the site.

g. Watershed Geo: A geosynthetic technology company and the designer of the ClosureTurf® final cover system.

101.4 Qualifications:

a. Geomembrane Manufacturer:

a1. The Geomembrane Manufacturer shall be approved by the Owner.

a2. The Geomembrane Manufacturer shall be approved by Watershed Geo for supplying the geomembrane component of the ClosureTurf® final cover system (or Owner-approved equal).

b. Geosynthetics Contractor:

b1. The Geosynthetics Contractor shall be approved by the Geomembrane Manufacturer for installation of the Geomembrane Manufacturer’s products.

b2. The Geosynthetics Contractor shall be approved by the Owner.

b3. Geosynthetics Contractor personnel shall attend ClosureTurf® orientation provided by Watershed Geo prior to the start of the Work if this project is the Geosynthetics Contractor’s first ClosureTurf® installation project.

b4. Geomembrane Seamers:

b4.1 Master Geomembrane Seamer shall have installed at least 5,000,000 square feet of geomembrane materials.

b4.2 All other geomembrane seamers shall have installed at least 1,000,000 square feet of geomembrane materials. Personnel who do not meet this criterion may be allowed to seam geomembrane materials but only under the direct supervision of the Master Geomembrane Seamer.

102. RELATED WORK SPECIFIED IN OTHER SECTIONS AND SPECIFICATIONS

102.1 The work specified in this section shall be coordinated with work specified in the following related sections and specifications:

a. GW Specification W-9100:

a1. Section 311522 – Engineered Synthetic Turf for Final Cover System.

a2. Section 312205 – Earthwork for CCR Surface Impoundment Closure.

b. CQA Specification W-9101:

b1. Section 014362 – Quality Assurance for Closing a CCR Surface Impoundment.

103. REFERENCE DOCUMENTS

103.1 Standards, specifications, manuals, codes and other publications of nationally recognized organizations and associations are referenced herein. Methods, equipment, and materials specified herein shall comply with the specified and applicable portions of the referenced documents, in addition to federal, state, or local agencies having jurisdiction.

103.2 References to these documents are to the latest issue date of each document, unless otherwise indicated, together with the latest additions, addenda, amendments, supplements, etc., thereto, in effect as of the date of Contract for the Work.

103.3 Abbreviations listed indicate the form used to identify the reference documents cited in this section.

103.4 ASTM – ASTM International:

a.	A276	Specification for Stainless Steel Bars and Shapes.
b.	B633	Specification for Electrodeposited Coatings of Zinc on Iron and Steel.
c.	D792	Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement.
d.	D1004	Test Method for Tear Resistance of Plastic Film and Sheeting.
e.	D1505	Test Method for Density of Plastics by the Density-Gradient Technique.
f.	D1603	Test Method for Carbon Black Content in Olefin Plastics.
g.	D4218	Test Method for Determination of Carbon Black Content in Polyethylene Compounds by the Muffle-Furnace Technique.
h.	D4833	Test Method for Index Puncture Resistance of Geomembranes and Related Products.
i.	D5199	Test Method for Measuring Nominal Thickness of Geosynthetics.
j.	D5397	Test Method for Evaluation of Stress Crack Resistance of Polyolefin Geomembranes Using Notched Constant Tensile Load Test.
k.	D5596	Test Method for Microscopic Evaluation of the Dispersion of Carbon Black in Polyolefin Geosynthetics.
l.	D5641	Standard Practice for Geomembrane Seam Evaluation by Vacuum Chamber.
m.	D5721	Standard Practice for Air-Oven Aging of Polyolefin Geomembranes.
n.	D5820	Standard Practice for Pressurized Air Channel Evaluation of Dual Seamed Geomembranes.
o.	D5885	Test Method for Oxidative Induction Time of Polyolefin Geosynthetics by High-Pressure Differential Scanning Calorimetry.
p.	D5994	Test Method for Measuring Core Thickness of Textured Geomembrane.
q.	D6392	Test Method for Determining the Integrity of Nonreinforced Geomembrane Seams Produced Using Thermo-Fusion Methods.

r. D6693 Standard Test Method for Determining Tensile Properties of Nonreinforced Polyethylene and Nonreinforced Flexible Polypropylene Geomembranes.

s. D7466 Test Method for Measuring Asperity Height of Textured Geomembranes.

t. D8117 Standard Test Method for Oxidative Induction Time of Polyolefin Geosynthetics by Differential Scanning Calorimetry.

103.5 GRI – Geosynthetic Research Institute:

a. GM6 Practice for Pressurized Air Channel Test for Dual Seamed Geomembranes.

b. GM9 Cold Weather Seaming of Geomembranes.

c. GM10 The Stress Crack Resistance of HDPE Geomembrane Sheet.

d. GM13 Test Methods, Test Properties and Testing Frequency for High Density Polyethylene (HDPE) Smooth and Textured Geomembranes.

e. GM14 Selecting Variable Intervals for Taking Geomembrane Destructive Seam Samples Using the Method of Attributes.

f. GM19a Seam Strength and Related Properties of Thermally Bonded Homogeneous Polyolefin Geomembranes/Barrier.

104. SUBMITTALS

104.1 GW Contractor shall submit the drawings and data as specified. GW Contractor's drawings and data shall be submitted via electronic medium in a format compatible for importing into the Owner's information systems (as specified by the Owner).

104.2 Submittals with the Bid Proposal:

a. HDPE Geomembrane Material:

a1. Certification of Compliance from the Geomembrane Manufacturer signed by its authorized representative indicating that the HDPE geomembrane sheeting material meets the criteria specified herein and that those requirements are guaranteed by the manufacturer.

a2. One representative sample of each type of HDPE geomembrane material.

a3. Geomembrane Manufacturer's Quality Control and Quality Assurance Policies and Procedures for the geomembrane materials being supplied for the project.

b. Warranty:

b1. Written warranties from the Geomembrane Manufacturer and the Geosynthetics Contractor covering the quality of the material and workmanship as specified.

b1.1 The minimum period of warranty for materials shall be 20 years with first year non-prorated.

b1.2 The minimum period of warranty for installation shall be 5 years with the first year non-prorated.

b2. Any warranty conditions proposed, including limits of liability, will be evaluated by the Owner in approving the Geomembrane Manufacturer and the Geosynthetics Contractor. Warranty conditions are considered to be valid justification for exclusion or one or more bids.

c. Geosynthetics Contractor:

c1. Geosynthetics Contractor’s name, address, and telephone number.

c2. Geosynthetics Contractor’s qualifications, including letter or certificate from the Geomembrane Manufacturer documenting the manufacturer’s approval of the Geosynthetics Contractor (or subcontracted Installer) to install the geomembrane materials supplied for the project.

c3. Installer’s qualifications if the Geosynthetics Contractor is proposing to subcontract installation work.

104.3 Submittals After Award of the Contract:

a. Geomembrane Resin:

a1. Geomembrane Manufacturer’s signed certificate that the resin meets the criteria specified herein.

a2. Geomembrane Manufacturer’s signed certification of the origin of the resin and that all resin is from the same manufacturer (including resin supplier’s name, identification brand name, and number).

a3. Copies of Geomembrane Manufacturer’s and resin supplier’s QA/QC certificates. Certificates shall include a summary report of test results conducted to verify the quality of the resin used in each batch used to manufacture geomembrane for this project. As a minimum, the report shall include tests on specific gravity, melt flow index, and percent carbon black.

b. Geomembrane Sheeting:

b1. Prior to material shipment to the site, the Geomembrane Manufacturer shall submit to the CQA Contractor representative samples of the geomembrane to be shipped to the site, along with chain of custody and certification that the samples submitted are from the geomembrane material to be delivered to the site. The number of samples shall be determined in accordance with the number of CQA conformance tests specified in Specification W-9101, Section 014362.

b2. Signed certification that the properties of the manufactured sheeting meet the criteria specified herein and are guaranteed by the Geomembrane Manufacturer.

b3. Statement certifying that no post consumer resin (PCR) has been added to the formulation.

b4. Statement certifying that the manufactured sheeting is free of per- and polyfluoroalkyl substances (PFAS).

b5. Copies of all of the Geomembrane Manufacturer’s QA/QC certificates. The certificates shall include documents of test results.

c. Extrudate Resins or Rod for Seaming Geomembranes:

c1. Certification that all extrudate is the same resin type as the geomembrane and was obtained from the same resin supplier as the resin used to manufacture the geomembrane.

d. Installation Data:

d1. Geomembrane Manufacturer's proposed geomembrane panel layout for each installation.

d2. Geomembrane Manufacturer's recommended procedures for making and testing seams if different from those specified herein.

d3. Geomembrane Manufacturer's recommended procedures for repairing damaged geomembrane sections and seams if different from those specified herein.

d4. Geomembrane Manufacturer's details of geomembrane liner anchorage and attachment to concrete structures if different from those specified herein and from the details shown on the Design Drawings.

104.4 Submittals After Installation is Complete:

a. Geosynthetics Contractor:

a1. As-built panel layout.

a2. Drawing showing location of repairs and type of repairs made.

a3. Location of destructive tests.

a4. Results of destructive tests.

a5. Results of non-destructive tests.

105. QUALITY ASSURANCE

105.1 Materials and construction procedures shall be subject to inspection and testing by the CQA Contractor employed by the Owner. Such inspections and tests will not relieve the Geosynthetics Contractor of responsibility for providing materials and installation in compliance with specified requirements.

105.2 The Owner reserves the right, at any time before final acceptance, to reject materials or workmanship not complying with specified requirements. The Geosynthetics Contractor shall correct the deficiencies which the inspections and tests have indicated are not in compliance with specified requirements.

105.3 CQA activities shall be performed as described herein and in Specification W-9101.

PART 2 - PRODUCTS

201. HIGH DENSITY POLYETHYLENE GEOMEMBRANE

201.1 Manufacturers of HDPE Geomembrane Products:

a. The products of the following manufacturers meeting the requirements herein are acceptable:

a1. Watershed Geo and their supplier AGRU America Manufacturing, Inc., 500 Garrison Road, Georgetown, SC 29440, Tel.: 800-373-2478.

a2. Owner-approved equal.

201.2 General Requirements:

a. All HDPE geomembrane shall be textured on both sides and meet the requirements of Table 319022-1.

b. Textured surfaces shall be manufactured using a co-extrusion process.

c. Textured geomembranes shall have uniform texturing appearance. The geomembrane shall be free from agglomerated texturing material and such defects that would affect the specified properties of the geomembrane.

d. Each roll of geomembrane shall have 6-inch wide (minimum) smooth edges to provide suitable seaming surfaces. Textured geomembrane without smooth edges may be provided if approved by the Owner.

e. The HDPE geomembrane shall be manufactured from first quality, virgin resin. Blending of resins shall not be allowed. No recycled or reworked geomembrane may be used except edge trim generated during the manufacturing process, which shall be limited to at most 10%. No post-consumer resin (PCR) of any type shall be added to the formulation.

f. The resin used to produce the geomembrane shall be formulated to be resistant to chemical and ultraviolet degradation.

g. The geomembrane shall be free of plasticizers.

h. The geomembrane shall be free of leachable additives.

i. The geomembrane shall be free of per- and polyfluoroalkyl substances (PFAS).

j. During manufacture, each roll of geomembrane shall be continuously monitored across the width to assure uniformity of thickness. Thickness measurements shall meet the requirements of Table 319022-1.

k. The geomembrane shall be free of factory seams.

l. The geomembrane shall be free from dirt, oil, foreign matter, scratches, cracks, creases, bubbles, blisters, pits, tears, holes, pores, pinholes, voids, undispersed raw material, any sign of contamination or other defects that may affect serviceability, and shall be uniform in color, thickness, and surface texture.

m. The geomembrane shall be capable of being seamed in the field to yield seams that are as resistant to waste liquids as the sheeting.

n. The geomembrane shall be manufactured in the United States or Canada.

TABLE 319022-1

HIGH DENSITY POLYETHYLENE TEXTURED GEOMEMBRANE REQUIREMENTS[1]

Property	ASTM Test Method	Polyethylene Base Compound	Geomembrane	Testing Frequency
Nominal Thickness (mil)	--	--	60	--
Resin Properties				
Density of Base Resin, g/cc (min.)	D1505 / D792	0.932		5,000 lbs. of Resin
Oxidative Induction Time (OIT) (min. ave.)				
a. Standard OIT (minutes)	D8117	100	--	5,000 lbs. of Resin
– or –				
b. High Pressure OIT (minutes)	D5885	400	--	5,000 lbs. of Resin
Oven Aging at 85°C	D5721	--	--	
a. Standard OIT (min. ave.), % retained after 90 days	D8117	55	--	One per Formulation
– or –				
b. High Pressure OIT (min. ave.), % retained after 90 days	D5885	80	--	One per Formulation
UV Resistance				
High Pressure OIT (min. ave.), % retained after 1600 hrs.	D5885	50	--	One per Formulation
Analytical Properties				
Formulated Density, g/cc (min.)	D1505 / D792	--	0.940	5,000 lbs. of Resin
Carbon Black Content, % (range)	D4218	2.0 – 3.0	--	5,000 lbs. of Resin
Carbon Black Dispersion for 10 Different Views	D5596	Note (2)	--	5,000 lbs. of Resin
Mechanical Properties				
Thickness, mils	D5994	--	--	One per Roll
Minimum Average			57	
Lowest Individual for 8 out of 10 Values			54	
Lowest Individual for 10 out of 10 Values			51	
Asperity Height, mils (min. ave.)	D7466	--	16	Every Second Roll(3)
Tensile Properties in Each Direction (min. ave.)	D6693 (Type IV Specimen at 2 ipm)			5,000 lbs. of Resin
Tensile Stress at Yield, ppi (min.)		--	126	
Elongation at Yield, % (min.)		--	12	
Tensile Stress at Break, ppi (min.)		--	90	
Elongation at Break, % (min. 2” gage length)		--	100	
Tear Resistance, lbs. (min. ave.)	D1004		42	5,000 lbs. of Resin
Puncture Resistance, lbs. (min. ave.)	D4833		90	5,000 lbs. of Resin
Bonded Seam Strength(4)	D6392	--	--	
Shear Strength, ppi		--	120	
Peel Adhesion (Hot Wedge), ppi		--	91	
Peel Adhesion (Extrusion Fillet), ppi		--	78	
Environmental Aging Effect on Properties				
Stress Crack Resistance, hours (min.)	D5397	--	500	Per GRI GM10

Notes:

(1) Requirements shown in this table meet the minimum requirements of GRI Standard GM13, Revision 16 (March 17, 2021) except for bonded seam strength.

(2) Carbon black dispersion (only near spherical agglomerates) for 10 different views: 9 in Categories 1 or 2 and 1 in Category 3.

(3) Alternate measurement side for double-sided textured sheet.

(4) Seam strength requirements shown in this table meet the minimum requirements of GRI Standard GM19a, Revision 10 (March 18, 2021).

201.3 Panel Layout:

a. Prior to manufacture of the geomembrane, a panel layout of the surface to be covered shall be made. Each panel to be used for the installation shall be given a numeric or alphanumeric identification number.

b. Each panel identification number shall be related in writing to the manufacturing roll number that identifies the resin type, batch number, and date of manufacture.

c. The panel layout shall be made considering the following requirements:

c1. Panel lengths shall include slope gain and run-out distance / anchorage.

c2. Perpendicular tie-ins shall be made a minimum of 5 feet beyond the toe of the slope.

c3. A minimum of 6 inch overlap shall be allowed at double fusion welded seams.

c4. All field seams on slopes shall be oriented parallel to the slope (oriented along, not across the slope).

c5. The number of seams in corners or odd shaped geometric locations shall be minimized.

201.4 Packaging and Shipping:

a. All geomembrane materials shall be shipped to the project site in rolls. No material shall be folded.

b. Packaging and transportation of all geomembrane materials to the project site shall be the responsibility of the Geomembrane Manufacturer, who shall retain responsibility of the material until the material is accepted at the site. The Geosynthetics Contractor shall be responsible for unloading the HDPE geomembrane materials at the project site.

c. A label shall be attached or adhered to each roll of the geomembrane, identifying the following:

c1. Name of Geomembrane Manufacturer.

c2. Product Identification (e.g., brand name, product code), which can be traced back to the origin of the base material (resin supplier’s name, resin production plant, resin brand name type, resin brand number, and production date of the resin).

c3. Date of manufacture of the geomembrane.

c4. Roll identification number.

c5. Geomembrane thickness and type.

c6. Roll dimensions (length and width) and weight.

c7. Manufacturing lot number.

c8. Order number.

c9. Panel number, which shall be referenced to the proposed HDPE geomembrane panel layout drawing prepared by the Geosynthetics Contractor.

202. MATERIALS FOR ATTACHMENT OF GEOMEMBRANE TO CONCRETE

202.1 Batten Strip:

a. Batten strip material shall be hot rolled, annealed, and pickled Type 316L stainless steel in accordance with ASTM A276.

b. Strips shall be ¼ inch thick by 2 inches wide. Random lengths are acceptable.

202.2 Expansion Anchors:

a. Expansion anchors shall be stud type with a single piece three section wedge and zinc plated in accordance with ASTM B633. Wedges shall be manufactured from ANSI Type 304 stainless steel. Hilti Kwik Bolt 3 Expansion Anchors, or equal, are acceptable.

b. Wedge type anchors shall have a minimum yield strength of 60,000 psi. Stud type anchors shall have a minimum tensile strength of 65,000 psi.

c. Anchors shall be 3/8 inch diameter by 3 1/2 inches long.

d. Washers for anchors shall be Type 18-8 stainless steel flat washers for 3/8 inch diameter bolt size.

202.3 Neoprene Gaskets for Batten Strips:

a. Neoprene gaskets shall be 1/4 inch thick by 2 inches wide, closed cell neoprene sponge sealing strips. Operating temperature range of neoprene shall be –40°F to +220°F.

b. Neoprene gaskets placed against concrete shall have a pressure sensitive adhesive on the side of the gasket placed against the concrete.

PART 3 - EXECUTION

301. ONSITE HANDLING AND STORAGE

301.1 Unloading:

a. Unloading and storage of materials shall be the responsibility of the Geosynthetics Contractor.

b. Upon arrival at the site, the geomembrane rolls shall be carefully unloaded by the Geosynthetics Contractor in accordance with the Geomembrane Manufacturer's recommendations and in a manner to ensure that the material is not damaged.

301.2 Storage:

a. The Owner will provide on-site, outdoor storage space in a location near the areas to be covered.

b. The Geosynthetics Contractor shall store and stage geomembrane rolls such that on-site transportation and handling are minimized.

c. The Geosynthetics Contractor shall be responsible for protecting geomembrane rolls from damage, moisture, theft, and vandalism.

d. The rolls of geomembrane shall be placed on a smooth surface free of rocks and standing water.

301.3 Inspection:

a. Upon delivery of the material to the project site, the Geosynthetics Contractor shall conduct a visual inspection of all rolls of geomembrane for damage or defects. This inspection shall be done without unrolling any rolls unless damage to the inside of a roll is found or suspected.

b. Any damage or defects shall be noted and immediately reported to the Owner, the Geomembrane Manufacturer, and to the carrier that transported the material. Any roll or portion thereof, which, in the judgement of the Owner, is seriously damaged, shall be removed from the project site and replaced with complying material at no additional cost to the Owner.

302. PREPARATION OF SURFACES TO BE COVERED

302.1 General:

a. The Earthwork Contractor shall be responsible for preparing and maintaining the surfaces to be covered as specified in Section 312205 prior to placement of the geomembrane.

b. The Geosynthetics Contractor shall confirm the conditions of the finished surfaces to be covered prior to deployment of HDPE geomembrane.

302.2 Grading Requirements:

a. The subgrade surface on which a lining is to be placed shall be graded to elevations shown on the Design Drawings. Tolerances shall be as specified in Section 312205.

302.3 Preparation of Concrete Surfaces:

a. All concrete surfaces that will come in contact with a geomembrane shall be free of sharp edges or rough spots that can puncture or abrade the geomembrane. Where necessary, the concrete shall be ground smooth by the Earthwork Contractor.

b. Where specified on the Design Drawings, one or more layers of geomembrane scuff strips shall be placed between the concrete and the geomembrane to act as a protective layer for the geomembrane cap.

302.4 Subgrade Acceptance:

a. See Section 312205 regarding inspection and acceptance of surfaces to be covered.

303. FIELD PLACEMENT OF THE GEOMEMBRANE COVER

303.1 General Requirements:

a. Placement Procedure: The placement procedure used for the geomembrane cover shall include the conditions listed below.

b. Weather:

b1. Geomembrane shall not be placed when the air temperature is above 104°F or below 41°F unless it can be demonstrated to the approval of the Owner by trial welds that acceptable welds can be made at the prevailing temperature. Trial welds shall be as described in Paragraph 303.2c. Under no circumstances shall geomembrane be deployed when the air temperature is below 5°F.

b1.1 If the air temperature is above 32°F, trial welds shall be as described in Paragraph 303.2c.

b1.2 If the air temperature is at or below 32°F, trial welds and field seaming shall be as described in GRI Test Method GM9.

b2. Geomembrane shall not be deployed or placed when there is any rainfall or snowfall, in the presence of excessive moisture due to fog or dew, in ponded water, on a frozen subgrade, or during high winds.

c. Panel Layout:

c1. The panels shall be placed in accordance with the Geomembrane Manufacturer’s panel layout drawing to ensure that they are placed in the proper direction for seaming.

c2. If panels are installed in a location other than indicated on the Geomembrane Manufacturer’s panel layout drawing, the revised location shall be indicated on an "as-built" layout drawing. The “as-built” record drawing shall be submitted to the Owner and CQA Contractor after all of the geomembrane has been placed and seamed.

d. Panel Deployment:

d1. Only the panels that can be anchored and seamed together in one shift shall be unrolled.

d2. Unroll and layout panels in as close to the final position as possible. Pulling geomembrane panels should be minimized to reduce the chance of permanent tension.

d3. The methods and equipment used to deploy the panels shall not damage the geomembrane or the supporting surface.

d4. Wrinkles and folds shall be minimized. However, enough slack shall be provided in both directions so that there will be no tension in the geomembrane at the lowest expected operating temperature.

e. Precautions to Prevent Wind Damage:

e1. If possible, work shall be oriented in the direction of the prevailing wind.

e2. To prevent uplift of the geomembrane by wind, the Geosynthetics Contractor shall provide adequate temporary loading and/or anchoring of the geomembrane by the use of sandbags, tires or other means which will not damage the geomembrane.

f. Other Precautions to Prevent Damage:

f1. Protection of the geomembrane from damage due to foot traffic on the slopes shall be provided.

f2. Provisions of facilities for safe entrance and egress of employees from sloped depressions is required.

g. Replacement of Damaged Geomembrane:

g1. Any area of a panel, which, in the judgement of the Owner and/or the CQA Contractor, becomes seriously damaged (torn, twisted, or crimped permanently) shall be replaced at no additional cost to the Owner.

303.2 Field Seaming:

a. Method of Seaming:

a1. The primary welding procedure for seams shall be double wedge fusion welding.

a2. Extrusion welding shall be used only for repairs, detail work, and for seaming where double wedge fusion welding is not possible.

a3. The rods used for extrusion welding shall be the same type of resin as the geomembrane, unless otherwise approved by the Owner.

a4. The use of solvents or adhesives is not permitted.

b. General Requirements for Seaming:

b1. On slopes steeper than 10 horizontal to 1 vertical, seams shall be oriented parallel to the line of maximum slope (oriented up and down, not across the slope) when possible. No seams oriented across the slope shall be used unless approved by the Owner.

b2. Seams parallel to the toe of the slope shall be located a minimum of 5 feet from the toe.

b3. Seams parallel to the crest of the slope shall be located a minimum of 2 feet from the crest.

b4. Seams at the bottom of a slope shall be overlapped so that the upslope sheet is positioned above the downslope sheet.

b5. Seaming shall extend to the outside edge of panels to be covered with fill material or to be placed in an anchor trench. Seams at sheet corners of three or four sheets shall be completed with a patch having a minimum dimension of 24 inches, extrusion welded to the parent sheets.

b6. All cross seams between the two rows of seamed panels shall be welded during the coolest time of the day to allow for contraction of geomembrane.

c. Trial Welds Prior to Beginning Seaming:

c1. Trial welds are required for pre-qualification of personnel, equipment, and procedures for making seams on identical geomembrane material under the same climatic conditions as the actual field production seams will be made.

c2. Trial welds shall be made as follows:

c2.1 Prior to each seaming period.

c2.2 Every 4 to 5 hours (i.e., at the beginning of the work shift and after the lunch break).

c2.3 Whenever personnel or equipment are changed.

c2.4 When climatic conditions result in wide changes in geomembrane temperature.

c2.5 When requested by the CQA Geomembrane Inspector for any seaming crew or piece of welding equipment if problems are suspected.

c3. Once qualified by passing a trial weld, welding technicians shall not change parameters without performing another trial weld.

c4. Trial welds shall be made on both double wedge fusion welds and on extrusion welds.

c5. A test strip shall be prepared by joining two pieces of geomembrane, each piece shall be at least 6 inches wide. The length of double wedge fusion welded seams shall be a minimum of 10 feet long. The length of an extrusion welded seam shall be a minimum of 4 feet long. The CQA Geomembrane Inspector shall witness the fabrication of each test strip.

c6. All test welds shall be tested by destructive testing. Testing can be done as soon as the seam cools.

c7. A minimum of three (3) one (1) inch wide sample strips shall be cut from each test strip, one from each end and one from the middle. The location of each sample shall be selected by the CQA Geomembrane Inspector. The test strips shall be tested in peel at 2 inches per minute using a field tensiometer. The CQA Geomembrane Inspector shall witness all tests.

c8. If any of the test specimens fail, a new test strip shall be fabricated and the tests repeated for the new strip. If additional specimens fail, the seaming apparatus and the seamer shall not be accepted and shall not be used for seaming until the deficiencies are corrected and successful trial welds have been achieved.

c9. The trial weld is considered acceptable if, when tested for peel adhesion using the field tensiometer, all three specimens meet the criteria specified for both the peel and shear under Bonded Seam Strength in Table 319022-1, or the three specimens exhibit Film Tear Bond (FTB) (yielding of the parent material before seam failure). In the case of double wedge fusion welded seams, both welds must pass in order to be considered acceptable.

c10. If the specimens pass the tests, production seaming operations can begin.

c11. The Geosynthetics Contractor shall document all data on each trial weld, including:

c11.1 Date.

c11.2 Time.

c11.3 Operator.

c11.4 Machine number.

c11.5 Ambient temperature.

c11.6 Operating temperature.

c11.7 Speed setting.

c11.8 Pass/Fail designation.

d. Preparation for Seaming:

d1. Prior to seaming, the surface of the geomembrane shall be wiped with a clean cloth to ensure that it is clean and free from moisture, grease, dust, dirt, and debris of any kind before seam welding is started.

d2. The panels shall be adjusted so that the seams are aligned to eliminate wrinkles and fish mouths. Where necessary, fish mouths and wrinkles shall be cut to achieve flat overlap.

e. Seaming:

e1. Seaming shall be performed in accordance with the Geomembrane Manufacturer's accepted procedure.

e2. Double Wedge Fusion Welds:

e2.1 The panels shall be overlapped a minimum of 4 inches prior to welding.

e2.2 A vehicle-mounted automated hot wedge welding apparatus shall be used to make the seam.

e3. Extrusion Fillet Welding:

e3.1 Geomembrane overlap shall be a minimum of 3 inches for extrusion welding.

e3.2 Geomembrane panels shall be temporarily bonded using a hot air device prior to extrusion welding.

e3.3 The edge of the geomembrane to be fillet welded shall be pre-beveled before heat-tacking the seam in place.

e3.4 The seam overlap shall be ground (abraded) no more than one hour prior to welding.

e3.5 Grinding shall be performed in accordance with the Geomembrane Manufacturer’s instructions in a manner that does not damage the geomembrane.

e3.6 Grinding shall not extend more than 1/4 inch past the area to be covered with extrudate during welding.

e3.7 All grind marks shall be covered with extrudate.

303.3 Non-Destructive Field Testing:

a. General:

a1. All non-destructive field testing shall be performed and documented by the Geosynthetics Contractor.

a2. The CQA Geomembrane Inspector shall observe all non-destructive test procedures.

a3. One hundred (100) percent of the seam length shall be tested using non-destructive procedures to check the continuity of the field seams. Non-destructive testing is not meant to qualify seam strength.

a4. Air pressure testing shall be performed in accordance with ASTM D5820 and GRI GM6.

a5. Vacuum box testing shall be performed in accordance with ASTM D5641 and as specified herein.

a6. Continuity testing shall be performed as seaming progresses or as soon as a suitable length of seam is available, not at the completion of all field seaming.

b. Double Wedge Fusion Welded Seams:

b1. Double wedge fusion welded seams shall be tested using air pressure testing.

b2. The procedure for testing shall be as specified in GRI GM6 for the type and thickness of geomembrane in use.

b3. The following test pressures are applicable to all HDPE geomembrane:

b3.1 After an initial 2 minute pressure stabilization period, the pressure shall be maintained between 27 and 30 psi.

b3.2 The pressure shall be sustained for a minimum of 5 minutes. The loss of pressure shall not exceed a maximum of 3 psi in 5 minutes.

b3.3 If the pressure does not stabilize in the first two minutes or if the pressure loss exceeds the loss specified, the seam test shall be considered a failure.

b4. For every seam that fails a seam test:

b4.1 The leak or suspected leak shall be located and repaired.

b4.2 The repaired seam shall be re-tested as required until all leaks are identified, and repaired, and the seam passes a subsequent air pressure test.

b5. When the geometry of a double wedge fusion weld makes air testing impossible or impractical, vacuum testing may be used to test the seam.

c. Extrusion Welded Seams:

c1. Extrusion welded seams shall be tested using vacuum chamber testing in accordance with ASTM D5641.

c2. The completed seam shall exhibit no leakage when tested between 4 and 8 psi minimum vacuum for approximately 10 seconds.

c3. If leaks are discovered during testing, they shall be located, marked, and repaired.

c4. The repaired area shall be re-tested and exhibit no leakage.

d. Inaccessible Seams:

d1. Where extrusion welded seam locations make use of vacuum box testing impractical, then the electric wire method of testing shall be used or the seam shall be cap stripped as approved by the Owner.

d2. If cap stripping is approved by the Owner, the seams shall be cap stripped as described in Paragraph 304.4, with strips of the same type and thickness of geomembrane being installed. The cap stripping shall be performed in the presence of the Owner and the CQA Geosynthetics Inspector.

d3. The electric wire test method shall consist of placing a 24 gauge copper wire 1/8 inch beneath the top sheet overlap of the two sheets prior to welding with the extruder. The wire shall be imbedded in the seam. After welding, a holiday spark detector, operating at 20,000 volts, shall be connected to one end of the wire, and slowly moved over the length of the seam. A seam defect between the probe and the embedded wire shall result in an audible alarm indicating where the defect is located.

e. Test Reports:

e1. Test reports for all air pressure tests shall contain all data specified in ASTM D5820 and GRI GM6.

e2. Test reports for vacuum box testing shall contain all the data specified in ASTM D5641.

e3. Test reports for other types of non-destructive tests shall contain as a minimum for each test:

e3.1 Location.

e3.2 Type of test.

e3.3 Test parameters.

e3.4 Test data.

e3.5 Test number.

e3.6 Name of tester.

e3.7 Outcome of the test.

303.4 Destructive Testing:

a. Testing:

a1. Destructive testing shall be performed by an independent third party laboratory employed by the CQA Contractor on samples cut from production welds in the field by the Geosynthetics Contractor.

a2. Samples shall be taken by the Geosynthetics Contractor to the third party laboratory and tested for shear strength and peel adhesion. For double wedge seam samples, both welds shall be tested for peel adhesion.

b. Location and Frequency:

b1. Test locations shall be determined after seaming. The location where the test samples shall be marked by the CQA Geomembrane Inspector. Locations may be prompted by the appearance of excessive heating, contaminations, offset welds, or a suspected defect. Destructive test samples shall be taken at a minimum average frequency of one per every 500 linear feet of seam length.

b2. The Method of Attributes described in GRI GM14 may be exercised to minimize the number of test samples taken if more than 100 destructive seam samples will be required based on the sampling strategy given in Paragraph 303.4.b1.

b3. Each sample location shall be numbered and marked with permanent identification, and every sample location shall be indicated on a plan drawing prepared and maintained by the Geosynthetics Contractor. The following shall be recorded for each sample:

b3.1 Date and time.

b3.2 Ambient temperature.

b3.3 Seam number and location.

b3.4 Welding apparatus used.

b3.5 Name of Master Geomembrane Seamer.

b3.6 Reason for taking the sample.

b3.7 Size of sample.

b3.8 Test results.

b3.9 Name of tester.

b4. Samples shall be cut by the Geosynthetics Contractor in the presence of the CQA Geosynthetics Inspector.

b5. Test samples shall be cut every shift and taken by the Geosynthetics Contractor to the third party laboratory the same day that the sample is prepared.

c. Sample Size:

c1. The minimum sample size shall be 12 inches wide with a seam 16 inches long centered length wise in the sample.

c2. As agreed, to with Owner, a sample may be increased in size to accommodate the requirements of the third-party testing laboratory.

d. Field Testing:

d1. A one-inch wide specimen shall be cut from each end of each sample for field testing.

d2. Each one-inch wide specimen shall be tested with a field tensiometer for peel adhesion.

d3. The CQA Geomembrane Inspector shall witness each field test.

d4. A test is considered acceptable if a specimen meets the criteria for both peel and shear under Bonded Seam Strength specified in Table 319022-1, or exhibits Film Tear Bond (FTB). For double wedge fusion welds, both welds must pass the test. If either sample fails the field test, it shall be assumed that the seam will not pass the specified laboratory testing and the sample shall be given a fail designation.

e. Laboratory Testing:

e1. Samples shall be tested for shear strength and peel adhesion in accordance with ASTM D6392. Five specimens shall be tested for each test method.

e2. All samples shall meet minimum requirements for shear strength and peel adhesion given in Table 319022-1 under Bonded Seam Strength.

f. Test Results:

f1. In accordance with CQA Specification W-9101, verbal test results will be given to the CQA Contractor to the Geosynthetics Contractor within 24 hours of receipt of the samples. Written results will follow within one week.

f2. All test locations shall be marked with a pass/fail designation on the geomembrane and on the drawings maintained by the Geosynthetics Contractor for submittal to the Owner after the geomembrane cap has been installed.

g. Re-Testing if Failure Occurs:

g1. If a seam fails testing, one additional sample shall be taken 10 feet on each side of the location of the failed test. Additional samples shall continue to be taken at 10 foot intervals until tests show that seam strength is adequate and the zone in which the seam requires reconstruction is identified. Additional field and laboratory tests required to determine failed seams and any necessary patching and rework shall be performed at no additional cost to the Owner.

g2. All passing seams shall be bounded by two locations from which samples passing laboratory destructive tests have been taken.

g3. The entire seam length failing strength tests shall be reconstructed at no additional cost to the Owner.

g4. If the length of reconstructed seam exceeds 150 feet, a sample shall be taken of the reconstructed seam every 150 feet and shall pass destructive testing.

303.5 Inspection:

a. After seaming is complete, the Geosynthetics Contractor and the CQA Geomembrane Inspector shall conduct a detailed walk-down to visually check all seams and non-seam areas of the geomembrane.

b. All defects, holes, blisters, tears, signs of damage during installation, areas of undispersed carbon and holes from destructive or non-destructive testing shall be marked and repaired.

304. REPAIR OF DEFECTS AND SEAMS

304.1 Patching:

a. Patching shall be used to repair large holes, tears, and destructive sample locations.

b. All patches shall be round, oval, or shall have rounded corners.

c. All patches shall be made of the base geomembrane material and shall extend a minimum of 3 inches beyond the edges of the defect.

d. Patches shall be extrusion welded to the base sheet.

304.2 Grinding and Welding:

a. Grinding and welding shall be used to repair sections of extruded fillet seams with small defects.

304.3 Spot Welding:

a. Spot welding shall be used to repair small tears, pinholes, or other minor localized flaws.

304.4 Capping:

a. Capping shall be used to repair lengths of extrusion welded seams with large defects and to repair double wedge fusion welded seams.

b. Cap strips shall be made with strips of the same type and thickness of the geomembrane being installed. Strips shall extend a minimum of 6 inches beyond the weld and shall have rounded corners.

c. Cap strips shall be extrusion welded to the base sheet.

304.5 Cut Out and Replacement:

a. When approved by the Owner, a length of defective seam may be cut out and replaced with a strip of new material seamed into place.

304.6 Verification of Repairs:

a. All repairs shall be non-destructive tested using one of the procedures described in Paragraph 303.3.

b. Repairs passing non-destructive testing shall be deemed acceptable.

c. Repairs of a seam in excess of 150 feet in length shall have one destructive seam test per 150 feet in length.

305. ANCHORAGE OF GEOMEMBRANE

305.1 Excavation and Shaping:

a. The HDPE geomembrane cover shall be extended to the run-out distance indicated on the Design Drawings or, if otherwise indicated on the Design Drawings, anchored in an anchor trench.

b. If specified on the Design Drawings, an anchor trench shall be excavated by the Earthwork Contractor to the lines and widths shown on the Design Drawings prior to placement of the geomembrane cover.

c. A slightly rounded corner shall be provided in the trench where the geomembrane adjoins the trench to avoid sharp bends in the geomembrane. No loose soil shall be allowed to underlie the geomembrane in the anchor trench.

d. The anchor trench shall be adequately drained to prevent ponding or otherwise softening of the adjacent soils while the trench is open.

305.2 Backfilling:

a. See Section 311522 for anchor trench backfill requirements.

306. ATTACHMENT TO CONCRETE

306.1 Geomembrane shall be attached to concrete using batten strips in accordance with details on the Design Drawings.

END OF SECTION 319022

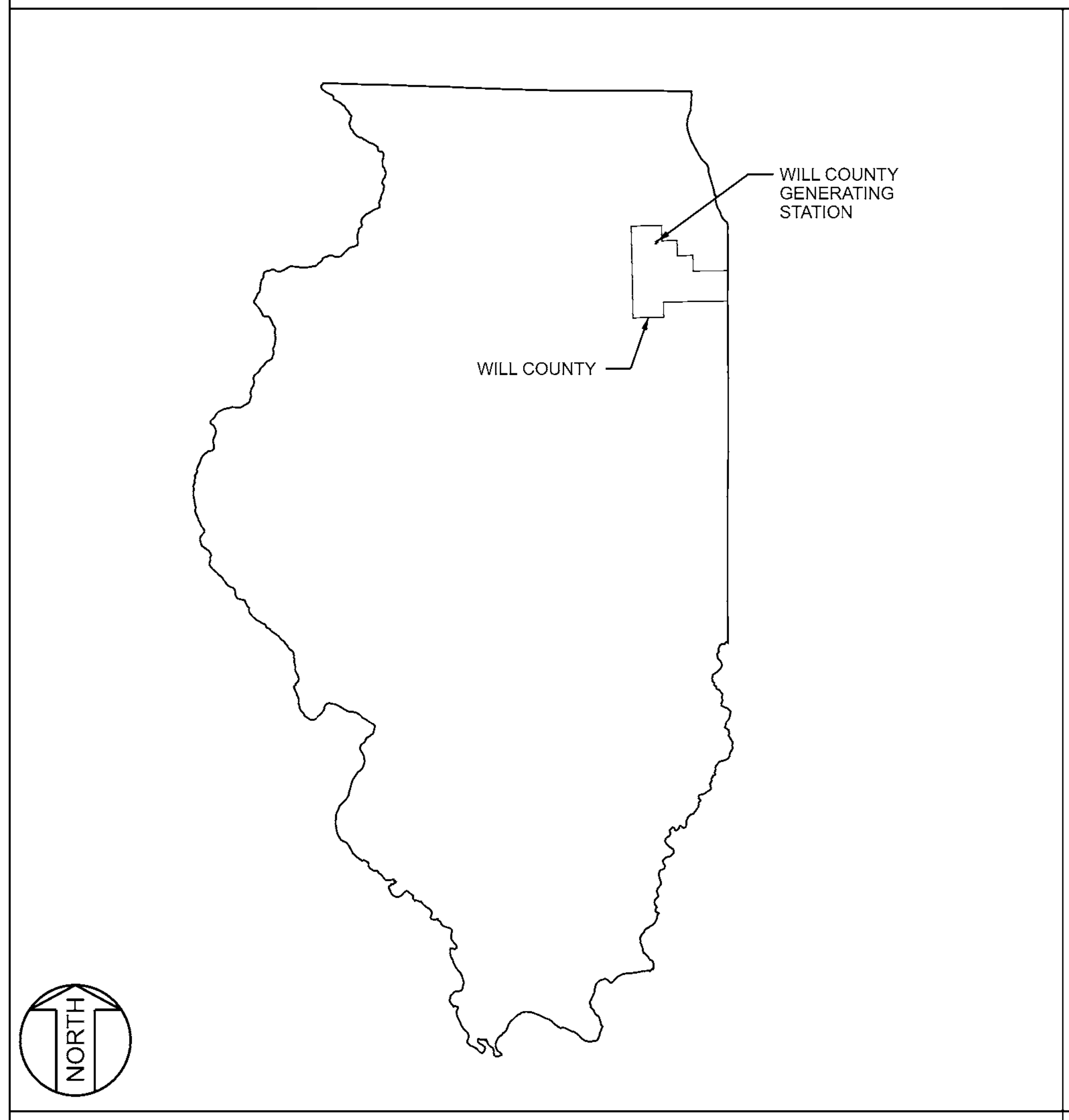
ATTACHMENT 1

DESIGN DRAWINGS

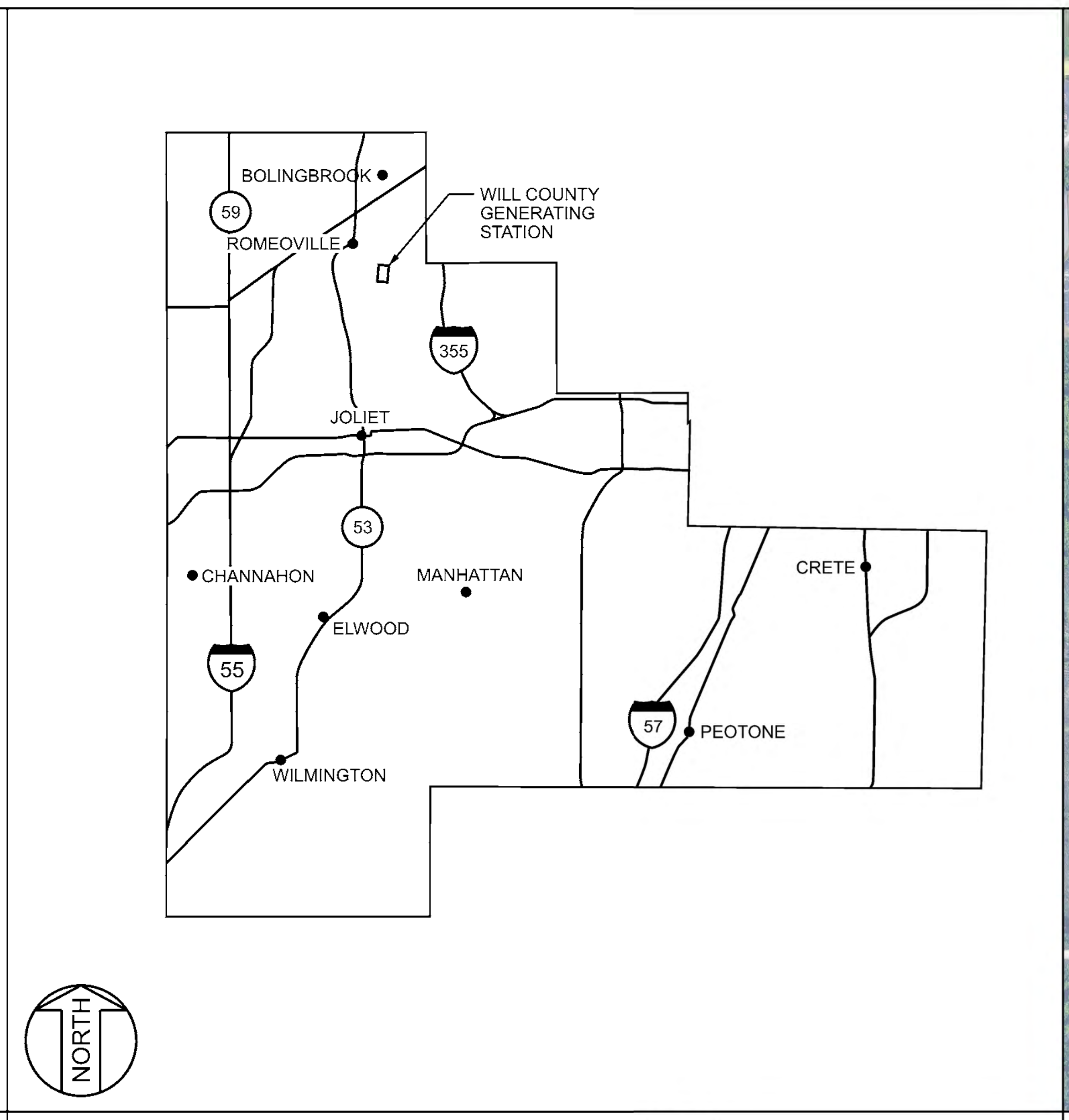
DRAWING NO.	REV.	TITLE
WC-APC-CSK-001	0	COVER SHEET
WC-APC-CSK-002	0	GENERAL NOTES
WC-APC-CSK-003	0	EXISTING CONDITIONS & DEMOLITION PLAN, PONDS 1N & 1S
WC-APC-CSK-004	0	EXISTING CONDITIONS & DEMOLITION PLAN, PONDS 2S & 3S
WC-APC-CSK-005	0	FINAL COVER SYSTEM GRADING PLAN, PONDS 1N & 1S
WC-APC-CSK-006	0	FINAL COVER SYSTEM GRADING PLAN, PONDS 2S & 3S
WC-APC-CSK-007	0	FINAL COVER SYSTEM SECTIONS & DETAILS

MIDWEST GENERATION, LLC
WILL COUNTY GENERATING STATION
CLOSURE OF PONDS 1N, 1S, 2S, AND 3S

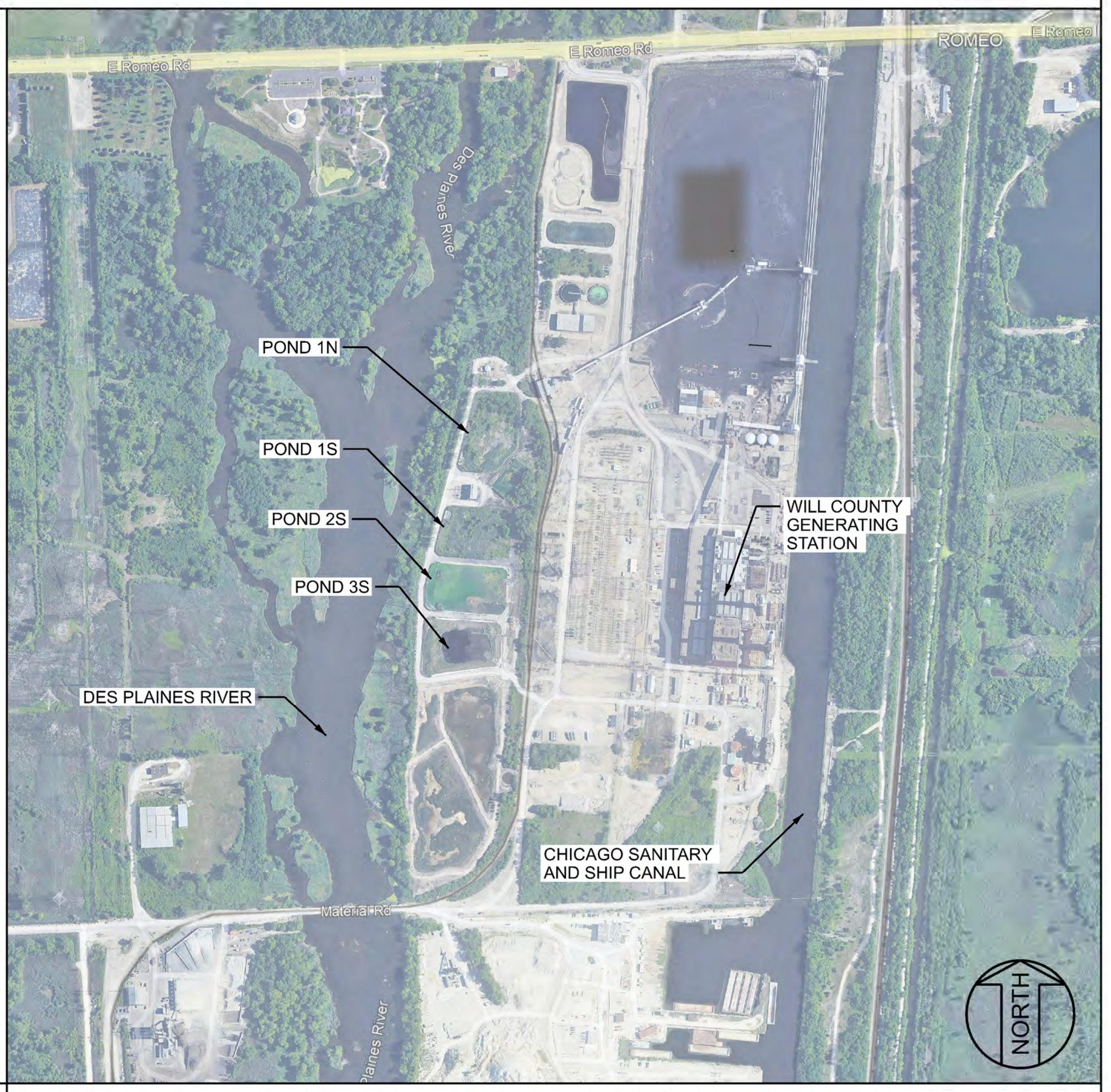
VICINITY MAP



ILLINOIS STATE MAP (N.T.S)



WILL COUNTY MAP (N.T.S)



SITE LOCATION ENLARGED PLAN (N.T.S)

DRAWING LIST

DWG NO.	DRAWING TITLE
WC-APC-CSK-001	COVER SHEET
WC-APC-CSK-002	GENERAL NOTES
WC-APC-CSK-003	EXISTING CONDITIONS & DEMOLITION PLAN, PONDS 1N & 1S
WC-APC-CSK-004	EXISTING CONDITIONS & DEMOLITION PLAN, PONDS 2S & 3S
WC-APC-CSK-005	FINAL COVER SYSTEM GRADING PLAN, PONDS 1N & 1S
WC-APC-CSK-006	FINAL COVER SYSTEM GRADING PLAN, PONDS 2S & 3S
WC-APC-CSK-007	FINAL COVER SYSTEM SECTIONS & DETAILS

PREPARED FOR:
MIDWEST GENERATION, LLC
WILL COUNTY GENERATING STATION
529 E. ROMEO RD.
ROMEOVILLE, IL 60446

PREPARED BY:
SARGENT & LUNDY
55 E. MONROE ST.
CHICAGO, IL 60603

FOR PERMIT
NOT FOR CONSTRUCTION

HOLD INFORMATION

NO.	DESCRIPTION

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/INSTALLER'S PERSONNEL (OR THAT OF ITS SUB-CONTRACTOR(S)) PERFORMING THE WORK.

RELEASE INFORMATION

REV.	DATE	DESCRIPTION
0	07-28-2023	FOR PERMIT

ISSUE PURPOSE:	PERMIT
SPECIFICATION:	W-9100
PROJECT NO.:	12661-153

I HEREBY CERTIFY THAT THIS ENGINEERING DOCUMENT WAS PREPARED BY ME OR UNDER MY DIRECT PERSONAL SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF ILLINOIS.

THOMAS J. DEHLIN
062-069314

THOMAS DEHLIN
07-28-2023

MY LICENSE RENEWAL DATE IS: 11-30-2023
PAGES OR SHEETS COVERED BY THIS SEAL:
THIS DOCUMENT ONLY.

CAD FILE NAME:	WC-APC-CSK-001.DGN
PREPARED BY:	M. KARNIA / J. CHAVEZ
REVIEWED BY:	T. DEHLIN
APPROVED BY:	T. DEHLIN

ANY MODIFICATION OR ADDITION TO THIS DRAWING BY AN ORGANIZATION OTHER THAN SARGENT & LUNDY, IS NOT THE RESPONSIBILITY OF SARGENT & LUNDY.

Sargent & Lundy LLC

SARGENT & LUNDY LLC
55 EAST MONROE STREET
CHICAGO, ILLINOIS 60603-5780

MWG
Midwest Generation, LLC

PROJECT

WILL COUNTY
GENERATING STATION
CLOSURE OF PONDS
1N, 1S, 2S, AND 3S

DRAWING TITLE

COVER SHEET

DRAWING NUMBER	REVISION
WC-APC-CSK-001	0

SHEET 1 OF 1

7/28/2023 12:27:45 PM
...\WC-APC-CSK-001.dgn

PL12793\DM1864\Z:\Shared\INFO CENTER\DISCIPLINE REF MATERIAL\CIVIL\DESIGN\2-Will County - CCR\Will County Ash Pond Closure 1N, 1S, 2S & 3S Drawings\WC-APC-CSK-001.dgn
Form CDG-0401-01-08, ANSI (Imperial) MicroStation Border - Size E - 34 x 44
Revision 11A, Revision Date: 04-30-2010

GENERAL NOTES

1. ALL WORK SHALL BE PERFORMED BY A GENERAL WORK (GW) CONTRACTOR ACCORDING TO THE REQUIREMENTS OF SPECIFICATION W-9100 UNLESS OTHERWISE NOTED ON THE DESIGN DRAWINGS.
2. THE GW CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR AND HAVE CONTROL AND CHARGE OF CONSTRUCTION MEANS, METHODS, TECHNIQUES, WORK SEQUENCING, AND PROCEDURES IN CONNECTION WITH THE WORK. THE GW CONTRACTOR SHALL CARRY OUT THE WORK IN ACCORDANCE WITH THE CONTRACT DOCUMENTS, COMPOSED OF THE DESIGN DRAWINGS AND SPECIFICATIONS.
3. ALL WORK DONE BY GW CONTRACTOR PURSUANT TO THESE DRAWINGS SHALL: (A) CONFORM TO THE GOVERNING CONTRACT DOCUMENTS; (B) BE PERFORMED EXCLUSIVELY BY ITS TRAINED, COMPETENT PERSONNEL OR, WHERE PERMITTED, THAT OF ITS SUBCONTRACTOR(S); AND (C) COMPLY WITH ALL APPLICABLE SAFETY LAWS, REGULATIONS, PROGRAMS AND PRACTICES TO ENSURE THE SAFETY OF ALL PEOPLE LOCATED ON THE WORK SITE, INCLUDING THE GW CONTRACTOR'S PERSONNEL (OR THAT OF ITS SUBCONTRACTOR(S)) PERFORMING THE WORK.
4. THE GW CONTRACTOR SHALL PERFORM INSTALLATION AND REMOVAL WORK IN A NEAT AND SKILLFUL MANNER, CAREFULLY TERMINATING WORK NEAR MATERIAL TO REMAIN IN PLACE. PRECAUTIONS SHALL BE TAKEN NOT TO DAMAGE OR DEFACE WORK, EXISTING FACILITIES, AND/OR MATERIAL TO REMAIN IN PLACE. THE GW CONTRACTOR SHALL BE RESPONSIBLE FOR ANY SUCH DAMAGE OR REPAIR THEREOF.
5. ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE REQUIREMENTS OF FEDERAL, STATE, OR LOCAL CODES, STANDARDS, AND SPECIFICATIONS.
6. ANY WORK FOUND DEFECTIVE OR NOT IN COMPLIANCE WITH THE REQUIREMENTS OF THE PROJECT SPECIFICATIONS OR THE DESIGN DRAWINGS SHALL BE REPLACED/FIXED AT NO ADDITIONAL COST TO THE OWNER.
7. COMPACTION:

   SEE SPECIFICATION W-9100 FOR COMPACTION AND EARTHWORK REQUIREMENTS.
8. SOIL EROSION AND SEDIMENTATION CONTROL:

   PROPER SOIL EROSION AND SEDIMENTATION CONTROL MEASURES SHALL BE INSTALLED TO MEET THE APPLICABLE REGULATORY CODES AND THE PERMIT REQUIREMENTS.
9. CONSTRUCTION QUALITY ASSURANCE:
   - A. MATERIALS AND CONSTRUCTION PROCEDURES WILL BE SUBJECT TO INSPECTION AND TESTING BY A CONSTRUCTION QUALITY ASSURANCE (CQA) CONTRACTOR EMPLOYED BY THE OWNER. SUCH INSPECTIONS AND TESTS WILL NOT RELIEVE THE GW CONTRACTOR OF THE RESPONSIBILITY FOR PROVIDING MATERIALS AND INSTALLATION IN COMPLIANCE WITH SPECIFIED REQUIREMENTS.
   - B. THE OWNER RESERVES THE RIGHT, AT ANY TIME BEFORE FINAL ACCEPTANCE, TO REJECT MATERIALS OR WORKMANSHIP NOT COMPLYING WITH SPECIFIED REQUIREMENTS. THE GW CONTRACTOR SHALL CORRECT THE DEFICIENCIES WHICH THE INSPECTIONS AND TESTS HAVE INDICATED ARE NOT IN COMPLIANCE WITH SPECIFIED REQUIREMENTS.
   - C. CQA ACTIVITIES WILL BE PERFORMED AS DESCRIBED ON THE DESIGN DRAWINGS AND IN SPECIFICATION W-9101.
10. TOPOGRAPHIC MAP & COORDINATES:
    - A. EXISTING TOPOGRAPHY FOR THE PROJECT SITE SHOWN ON THE DESIGN DRAWINGS WAS PREPARED IN 2022 BY RUETTIGER, TONELLI & ASSOCIATES, INC.
    - B. THE PLANT COORDINATE SYSTEM SHOWN ON THE DESIGN DRAWINGS IS BASED ON THE ILLINOIS STATE PLANE, EAST ZONE, NORTH AMERICAN DATUM OF 1983 (2011) (NAD 83/2011), U.S. SURVEY FEET.
11. HORIZONTAL AND VERTICAL CONTROL:
    - A. THE BASIS FOR HORIZONTAL CONTROL IS AS DESCRIBED IN NOTE 10.
    - B. THE BASIS FOR VERTICAL CONTROL IS THE LOCAL PLANT DATUM.
    - C. THE FOLLOWING PERMANENT BENCHMARKS FOR HORIZONTAL AND VERTICAL CONTROL HAVE BEEN ESTABLISHED AT THE PROJECT SITE. THE CONTRACTOR SHALL NOTIFY THE OWNER OF ANY DISCREPANCIES IN EXISTING BENCHMARK LOCATIONS AND/OR ELEVATIONS.

ID #	NORTHING	EASTING	ELEVATION
3	1,808,757.30	1,056,874.24	593.47

    - D. GW CONTRACTOR IS RESPONSIBLE FOR SETTING ADDITIONAL MONUMENTS AND CONTROL POINTS THAT THEY DEEM NECESSARY FOR COMPLETION OF THE WORK.
12. GEOTECHNICAL WORK:

    A STRUCTURAL STABILITY AND FACTOR OF SAFETY ASSESSMENT FOR PONDS 1N, 1S, 2S, AND 3S WAS PREPARED BY CIVIL & ENVIRONMENTAL CONSULTANTS, INC. IN SEPTEMBER 2021. SITE SPECIFIC SOIL DATA AND GEOTECHNICAL RECOMMENDATIONS ARE PROVIDED AND REFERENCED THEREIN.
13. EXISTING CONDITIONS:
    - A. DIMENSIONS OF EXISTING WORK SHALL BE VERIFIED BY THE GW CONTRACTOR PRIOR TO THE START OF WORK IN ACCORDANCE WITH THE SPECIFICATION AS FIELD CONDITIONS MAY VARY FROM INFORMATION SHOWN ON THE DESIGN DRAWINGS. DIMENSIONS NOTED FOR REFERENCE (REF) INDICATE NOMINAL DIMENSIONS FOR THE EXISTING STRUCTURE, UTILITY, ETC. NEW WORK SHALL NOT BE LOCATED BASED ON THE REFERENCE DIMENSIONS.
    - B. PRIOR TO COMMENCING THE WORK, THE GW CONTRACTOR SHALL EXAMINE THE AREAS AND CONDITIONS UNDER WHICH THE CLOSURE WORK IS TO TAKE PLACE, AND NOTIFY THE OWNER IN WRITING OF CONDITIONS WHICH MAY IMPACT THE PROPER AND TIMELY COMPLETION OF THE WORK.
    - C. UNDERGROUND OR EMBEDDED UTILITIES MAY EXIST WITHIN THE AREA OF AND ADJACENT TO THE LIMITS OF THE WORK. THE LOCATION OR IDENTIFICATION OF SUCH UTILITIES HAS NOT BEEN VERIFIED BY THE OWNER OR BY S&L. GW CONTRACTOR IS RESPONSIBLE FOR FIELD LOCATING AND IDENTIFYING UNDERGROUND OR EMBEDDED UTILITIES AND ANY OTHER UNDERGROUND OR EMBEDDED UTILITY DIMENSIONS.
    - D. REFERENCES USED HAVE BEEN IDENTIFIED ON EXCAVATION/FOUNDATION/DEMOLITION DRAWINGS AND HAVE BEEN PROVIDED TO ASSIST THE GW CONTRACTOR IN THE FIELD LOCATING EXISTING UTILITIES AND OTHER POTENTIAL UNDERGROUND OR EMBEDDED INTERFERENCES. THESE REFERENCES ONLY SHOW THE APPROXIMATE LOCATION OF POTENTIAL UNDERGROUND OR EMBEDDED UTILITIES AND MAY NOT INDICATE OR REFLECT ALL EXISTING UNDERGROUND OR EMBEDDED UTILITIES OR THEIR ACTUAL LOCATIONS.
    - E. REFERENCES IDENTIFIED SHALL NOT SUBSTITUTE FOR THE GW CONTRACTOR'S OBLIGATION TO FIELD LOCATE ANY UNDERGROUND OR EMBEDDED UTILITIES OR INTERFERENCES THAT MAY AFFECT THE WORK.
    - F. DUE CAUTION SHALL BE TAKEN DURING ANY EXCAVATION/FOUNDATION/DEMOLITION WORK WITHIN THE AREA OF, AND ADJACENT TO THE LIMITS OF THE WORK DUE TO POSSIBLE INTERFERENCES THAT MAY NOT BE REFLECTED ON THE REFERENCES IDENTIFIED.
    - G. THE GW CONTRACTOR SHALL BE RESPONSIBLE FOR THE PRESERVATION AND RESTORATION OF THE EXISTING UTILITIES IF DAMAGED DURING CONSTRUCTION AT NO ADDITIONAL COST TO THE OWNER.

ABBREVIATIONS

ROAD AND GRADING

T/RD	TOP OF ROAD ELEVATION
EL OR ELEV	GRADE ELEVATION
INV	INVERT ELEVATION
HP	HIGH POINT
LP	LOW POINT
HPFS	HIGH POINT FINISH SURFACING
BC	BEGINNING OF CURVE (HORIZONTAL CURVE)
EC	END OF CURVE (HORIZONTAL CURVE)
PI	POINT OF INTERSECTION (HORIZONTAL CURVE)
PT	POINT OF TANGENT
PC	POINT OF CURVE
STA	STATION
VC	VERTICAL CURVE
BVC	BEGINNING OF VERTICAL CURVE
EVC	END OF VERTICAL CURVE
PIVC	POINT OF INTERSECTION OF VERT. CURVE
PRC	POINT OF REVERSE CURVE
PCC	POINT OF COMPOUND CURVE
R	RADIUS
T	TANGENT
L	LENGTH OF CURVE
D	DEGREE OF CURVE
I	INTERIOR/DEFLECTION ANGLE OF CURVE
UN	UNLESS NOTED
ROW	RIGHT OF WAY
OHL	OVERHEAD LINE
OC	ON CENTER
WL	WATER LEVEL
HWL	HIGH WATER LEVEL
YR	YEAR
DS	DOWNSTREAM
US	UPSTREAM
CL	CENTERLINE
AC	ACRE
N.T.S.	NOT TO SCALE
LWL	LOW WATER LEVEL

SYMBOLS

	CENTERLINE OF NATURAL DRAINAGE PATTERN
	VALLEY LINE OR "V" DITCH
	SWALE
	CENTERLINE OF TRAPEZOIDAL DRAINAGE
	TRAPEZOIDAL DRAINAGE DITCH WITH BOTTOM WIDTH GREATER THAN 2'. BOTTOM WIDTH AND SIDE SLOPE SHOWN ON PLAN OR DETAIL
	RIPRAP EROSION PROTECTION
C-1	PIPE CULVERT CULVERT NUMBER SHOWN
DOWN	TOP OF EMBANKMENT SLOPE OR DITCH SIDE SLOPE AND DIRECTION OF SLOPE
3:1	HORIZONTAL TO VERTICAL SLOPE WHEN SLOPE IS CONSTANT
SLOPE VARIES	SLOPE IS NOT CONSTANT
1%	DIRECTION OF ROAD OR AREA SLOPE. PERCENT OF SLOPE SHOWN WHERE APPLICABLE
	TOP OF DIKE
R=50'	RADIUS OF CURVATURE
1	SECTION NUMBER (FIRST NUMBER=DRAWING SECOND NUMBER=SECTION NUMBER)
	CHAIN LINK FENCE
PLAN SECTION	WATER LINE
—G—G—	BURIED GAS LINE
—E—E—	BURIED ELECTRICAL CABLE
	INDEX CONTOUR
	INTERMEDIATE CONTOUR
— 405 —	ELEVATION CONTOUR
	EXISTING DEPRESSION
x 408.8	SPOT ELEVATION
x	VERTICAL CONTROL POINT
	HORIZONTAL CONTROL POINT
	EXISTING FIRE HYDRANT
	EXISTING UTILITY POLE
	EXISTING UTILITY POLE WITH GUY
	WOOD OR BRUSH OUTLINE
	GRATING
	SINGLE SIGN ON POST
	DOUBLE SIGN ON POST
●	GUARD POST

T. DEHLIN

SYMBOLS & ABBREVIATIONS

EROSION CONTROL SYMBOLS

—S—	SILT FENCE
—IP—	INLET PROTECTION
■ ■ ■	ROCK CHECK

SEWERS AND UNDERGROUND PIPE

CB	CATCH BASIN
C0	CLEANOUT
MH	MANHOLE
RE	RIM ELEVATION
℄	CENTERLINE
S	SLOPE
BOP	BOTTOM OF PIPE
PVC	POLY VINYL CHLORIDE PIPE
HDPE	HIGH DENSITY POLYETHYLENE PIPE
RCP	REINFORCED CONCRETE PIPE
CMP	CORRUGATED METAL PIPE
CHDPE	CORRUGATED HIGH DENSITY POLYETHYLENE PIPE
CISP	CAST IRON SOIL PIPE
DIWP	DUCTILE IRON WATER PIPE
STL	CARBON STEEL PIPE
IP	IN PLACE
SWS	STORM WATER SEWER
OWS	OILY WATER SEWER
SAN	SANITARY SEWER
PWS	PROCESS WASTE SEWER
C.S.	CARBON STEEL

ROAD, PAVEMENT AND SURFACING SYMBOLS

	ASPHALT OR CONCRETE PAVED ROAD. OUTER LINES SHOW OVERALL WIDTH. INTERIOR LINES SHOW EDGES OF PAVEMENT.
	ROCK SURFACED ROAD
—I—	ISOLATION JOINT
—IT—	THICKENED EDGE ISOLATION JOINT
—TE—	THICKENED EDGE EXPANSION JOINT
—T—	PAVEMENT THICKENED EDGE
—C—	CONTRACTION JOINT
	CONCRETE PAVING
	CRUSHED ROCK SURFACING
▨	ASPHALT PAVEMENT
☐	6" THICK CRUSHED STONE GROUND COVER SURFACING
	4" THICK SEEDED TOPSOIL

FOR PERMIT
NOT FOR CONSTRUCTION

UNDERGROUND OR EMBEDDED UTILITIES MAY BE LOCATED WITHIN OR ADJACENT TO THE AREA IN WHICH EXCAVATION, DEMOLITION, FOUNDATION, OR MODIFICATION WORK IS TO BE PERFORMED.

REFERENCES RELATING TO THE UNDERGROUND OR EMBEDDED UTILITIES ARE PROVIDED TO ASSIST THE CONTRACTOR/INSTALLER IN THE FIELD LOCATING THOSE UTILITIES AND OTHER POSSIBLE UNDERGROUND OR EMBEDDED INTERFERENCES WITH THE WORK.

THE CONTRACTOR/INSTALLER SHALL EXERCISE DUE CAUTION DURING ALL EXCAVATION/FOUNDATION/DEMOLITION WORK.

HOLD INFORMATION

NO.	DESCRIPTION

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/INSTALLER'S PERSONNEL (OR THAT OF ITS SUB-CONTRACTOR(S)) PERFORMING THE WORK.

RELEASE INFORMATION

REV.	DATE	DESCRIPTION
0	07-28-2023	FOR PERMIT

ISSUE PURPOSE: PERMIT
SPECIFICATION: W-9100
PROJECT NO.: 12661-153

I HEREBY CERTIFY THAT THIS ENGINEERING DOCUMENT WAS PREPARED BY ME OR UNDER MY DIRECT PERSONAL SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF ILLINOIS.

THOMAS J. DEHLIN
062-069314

THOMAS DEHLIN
07-28-2023

MY LICENSE RENEWAL DATE IS: 11-30-2023
PAGES OR SHEETS COVERED BY THIS SEAL:
THIS DOCUMENT ONLY.

CAD FILE NAME: WC-APC-CSK-002.DGN
PREPARED BY: M. KARNIA / J. CHAVEZ
REVIEWED BY: T. DEHLIN
APPROVED BY: T. DEHLIN

ANY MODIFICATION OR ADDITION TO THIS DRAWING BY AN ORGANIZATION OTHER THAN SARGENT & LUNDY, IS NOT THE RESPONSIBILITY OF SARGENT & LUNDY.

Sargent & Lundy LLC

SARGENT & LUNDY LLC
55 EAST MONROE STREET
CHICAGO, ILLINOIS 60603-5780

MWG
Midwest Generation, LLC

PROJECT

WILL COUNTY
GENERATING STATION
CLOSURE OF PONDS
1N, 1S, 2S, AND 3S

DRAWING TITLE

GENERAL NOTES

DRAWING NUMBER	REVISION
WC-APC-CSK-002	0
SHEET 1 OF 1	

NOTES	
1.	ALL WORK SHOWN ON THIS DRAWING SHALL BE PERFORMED BY SPECIFICATION W-9100 UNLESS NOTED OTHERWISE.
2.	FOR GENERAL NOTES, ABBREVIATIONS, AND SYMBOLS, SEE DRAWING WC-APC-CSK-002.
3.	ALL VEGETATION REMOVED FROM PONDS 1N AND 1S SHALL BE DISPOSED IN AN OFFSITE PERMITTED LANDFILL APPROVED BY THE OWNER.
4.	REMOVE ALL RIPRAP FROM EXISTING OUTLET PIPE AREAS, DECONTAMINATE OF CCR MATERIAL, AND PLACE IN AN ONSITE STOCKPILE AREA DESIGNATED BY THE OWNER.
5.	IF NECESSARY TO INSTALL THE FINAL COVER SYSTEM, THE STEEL BAFFLES SHALL BE REMOVED FROM THE CONCRETE EFFLUENT TROUGH WALLS AND PLACED IN AN ONSITE STOCKPILE AREA DESIGNATED BY THE OWNER.

REFERENCE DRAWINGS	
C-3	ASH PONDS 1N & 1S MODIFICATIONS, MODIFICATION PLAN
CSK-004	EXISTING CONDITIONS & DEMOLITION PLAN, PONDS 2S & 3S

LEGEND

FOR PERMIT
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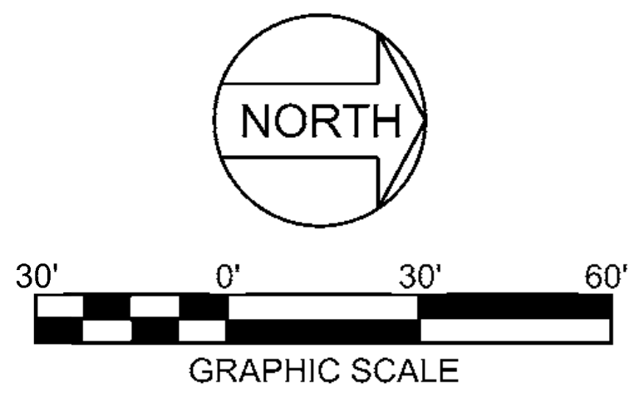

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RELEASE INFORMATION

REV.	DATE	DESCRIPTION
0	07-28-2023	FOR PERMIT

ISSUE PURPOSE: PERMIT
SPECIFICATION: W-9100
PROJECT NO.: 12661-153

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THOMAS DEHLIN
07-28-2023

MY LICENSE RENEWAL DATE IS: 11-30-2023
PAGES OR SHEETS COVERED BY THIS SEAL:
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THOMAS J. DEHLIN
062-069314

CAD FILE NAME: WC-APC-CSK-003.DGN
PREPARED BY: M. KARNIA / J. CHAVEZ
REVIEWED BY: T. DEHLIN
APPROVED BY: T. DEHLIN

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SARGENT & LUNDY LLC
55 EAST MONROE STREET
CHICAGO, ILLINOIS 60603-5780

MWG
Midwest Generation, LLC

PROJECT

WILL COUNTY
GENERATING STATION
CLOSURE OF PONDS
1N, 1S, 2S, AND 3S

DRAWING TITLE

EXISTING CONDITIONS &
DEMOLITION PLAN
PONDS 1N & 1S

DRAWING NUMBER	REVISION
WC-APC-CSK-003	0

SHEET 1 OF 1

PL12793\M1864\Z:\Shared\INFO CENTER\DISCIPLINE REF MATERIAL\CIVIL\DESIGN\2-Will County - CCR\Will County Ash Pond Closure 1N, 1S, 2S & 3S Drawings\WC-APC-CSK-003a.dgn
Form GDG-0401-01-08, ANSI (Imperial) MicroStation Border - Size E - 34 x 44
Revision 11A, Revision Date: 04-30-2010

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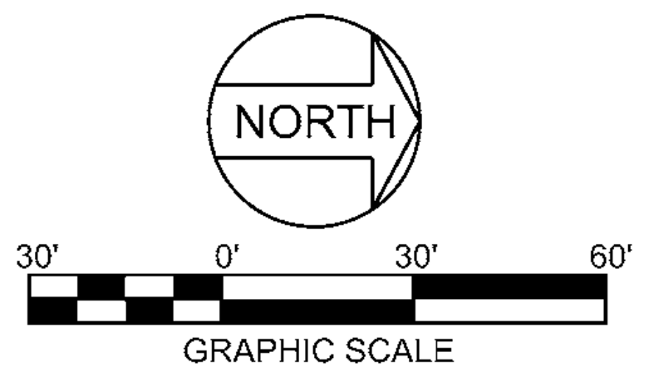

LEGEND

NOTES

1. ALL WORK SHOWN ON THIS DRAWING SHALL BE PERFORMED BY SPECIFICATION W-9100 UNLESS NOTED OTHERWISE.
2. FOR GENERAL NOTES, ABBREVIATIONS, AND SYMBOLS, SEE DRAWING WC-APC-CSK-002.
3. SURFACE WATER ELEVATIONS IN PONDS 2S AND 3S SHOWN ON THIS DRAWING REPRESENT THE SURFACE WATER CONDITIONS OBSERVED DURING THE TOPOGRAPHIC SURVEY PERFORMED IN DECEMBER 2022 BY RUETTIGER, TONELLI & ASSOCIATES, INC.
4. PONDS 2S AND 3S SHALL BE DEWATERED BY DRAINING OR PUMPING WATER INTO THE PONDS' RESPECTIVE CONCRETE EFFLUENT TROUGHS IN ACCORDANCE WITH THE EFFLUENT LIMITATIONS IN THE STATION'S NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT. ALL DISCHARGE METHODS SHALL BE APPROVED BY THE OWNER PRIOR TO THE GW CONTRACTOR DISCHARGING ANY WATER.
5. GW CONTRACTOR SHALL DEMOLISH PIPE SUPPORT STRUCTURE TO TOP OF CONCRETE FOUNDATION. CONCRETE FOUNDATION SHALL REMAIN IN-PLACE.
6. CUT INLET PIPING SOUTH OF ROAD AND CAP ENDS OF PIPES REMAINING IN PLACE. PLACE REMOVED PIPE SECTIONS IN ONSITE STOCKPILE AREA DESIGNATED BY THE OWNER.
7. REMOVED GUARD RAILS SHALL BE PLACED IN AN ONSITE STOCKPILE AREA DESIGNATED BY THE OWNER.
8. IF NECESSARY TO INSTALL THE FINAL COVER SYSTEM, THE STEEL BAFFLES SHALL BE REMOVED FROM THE CONCRETE EFFLUENT TROUGH WALLS AND PLACED IN AN ONSITE STOCKPILE AREA DESIGNATED BY THE OWNER.

REFERENCE DRAWINGS

CSK-003	EXISTING CONDITIONS & DEMOLITION PLAN, PONDS 1N & 1S

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PROJECT NO.: 12661-153

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CHICAGO, ILLINOIS 60603-5780

MWG
Midwest Generation, LLC

PROJECT

WILL COUNTY
GENERATING STATION
CLOSURE OF PONDS
1N, 1S, 2S, AND 3S

DRAWING TITLE

EXISTING CONDITIONS &
DEMOLITION PLAN
PONDS 2S & 3S

DRAWING NUMBER	REVISION
WC-APC-CSK-004	0

SHEET 1 OF 1

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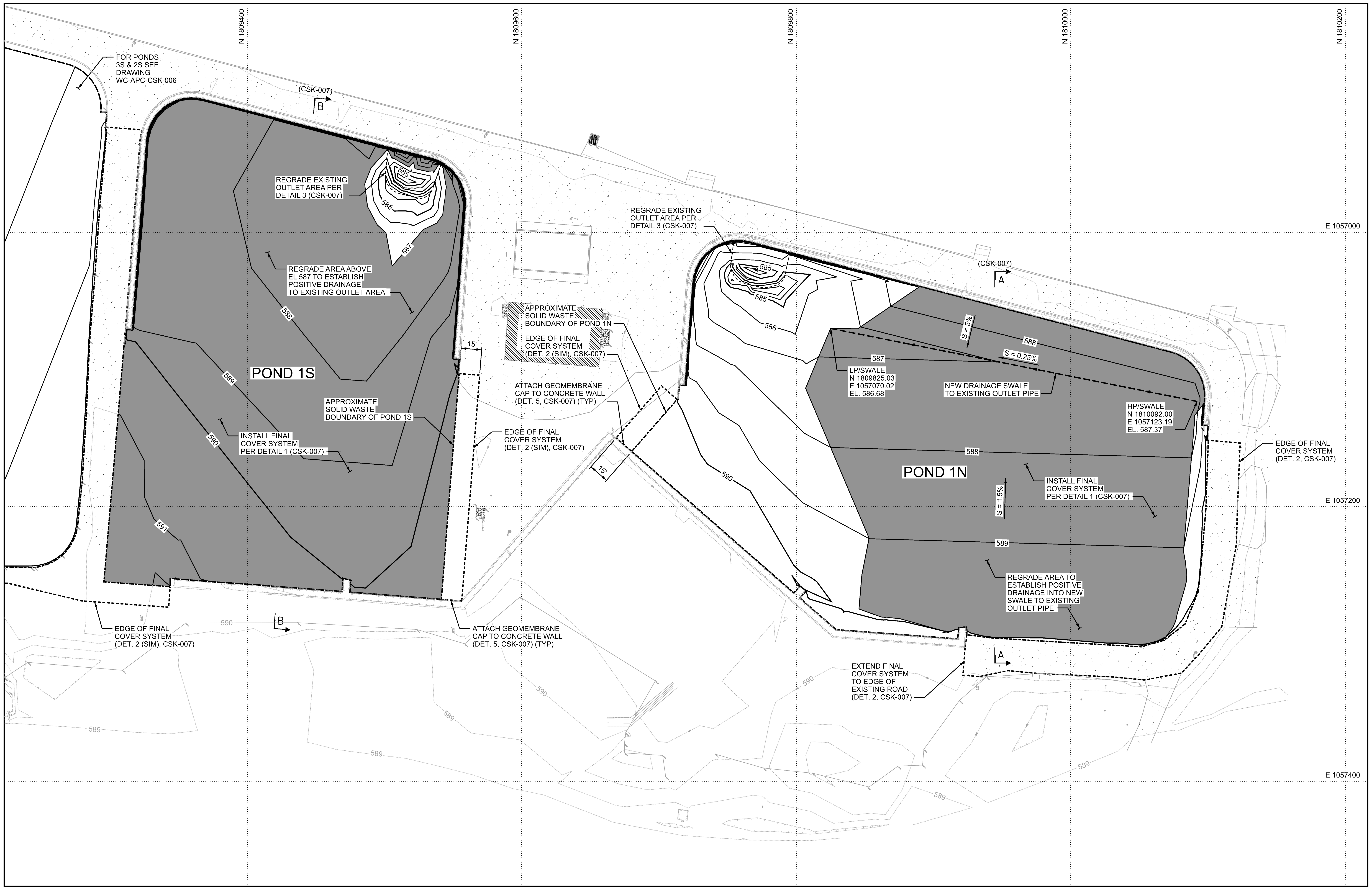
Revision 11A, Revision Date: 04-30-2010



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PROJECT

WILL COUNTY
GENERATING STATION
CLOSURE OF PONDS
1N, 1S, 2S, AND 3S

DRAWING TITLE

FINAL COVER SYSTEM GRADING PLAN
PONDS 1N & 1S

DRAWING NUMBER	REVISION
WC-APC-CSK-005	0
SHEET 1 OF 1	

NOTES

1. ALL WORK SHOWN ON THIS DRAWING SHALL BE PERFORMED IN ACCORDANCE WITH SPECIFICATION W-7900 UNLESS NOTED OTHERWISE.
2. FOR GENERAL NOTES, ABBREVIATIONS, AND SYMBOLS, SEE DRAWING WC-APC-CSK-006.
3. INSTALL FINAL COVER SYSTEM OVER PONDS 1N AND 1S PER DETAIL 1 ON DRAWING WC-AP-CSK-007.

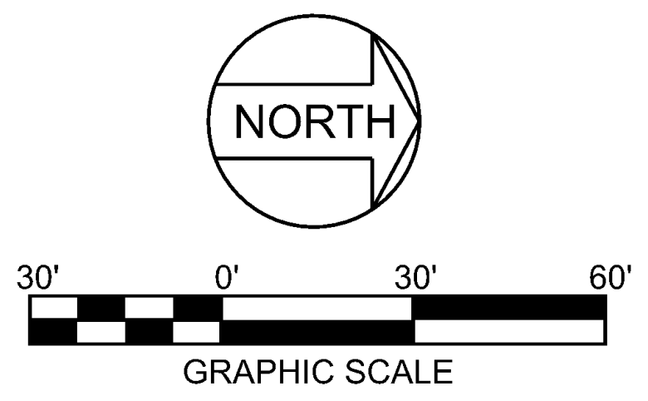
REFERENCE DRAWINGS

CSK-006	FINAL COVER SYSTEM GRADING PLAN, PONDS 2S & 3S
CSK-007	FINAL COVER SYSTEM SECTIONS & DETAILS

LEGEND

——585——	MAJOR CONTOUR
——584——	MINOR CONTOUR
— — ◄— —	DRAINAGE PATH

FOR PERMIT
NOT FOR CONSTRUCTION



GRAPHIC SCALE

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Revision 11A, Revision Date: 04-30-2010

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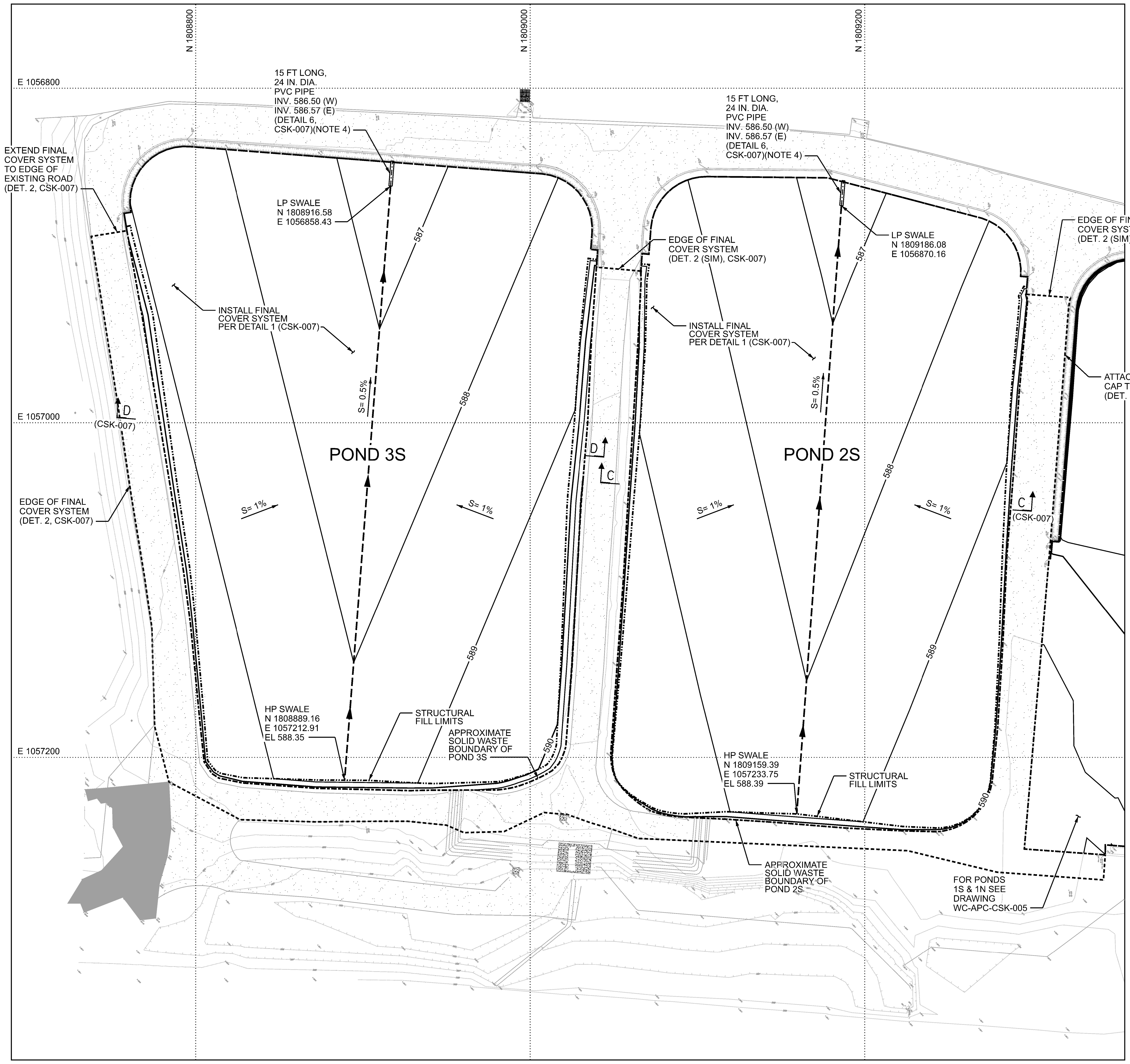

NOTES	
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2.	FOR GENERAL NOTES, ABBREVIATIONS, AND SYMBOLS, SEE DRAWING WC-APC-CSK-002.
3.	INSTALL FINAL COVER SYSTEM OVER PONDS 2S AND 3S PER DETAIL 1 ON DRAWING WC-AP-CSK-007.
4.	OUTLET PIPES IN PONDS 2S AND 3S SHALL MEET THE FOLLOWING REQUIREMENTS: - 24-IN. -DIA. PVC (DR 32.5) STORM SEWER PIPE PER AWWA C905. - PROJECT 1" FROM WEST FACE OF WEIR WALL INTO TROUGH. - MANUFACTURED BY JM EAGLE OR OWNER-APPROVED EQUAL.

REFERENCE DRAWINGS	
CSK-005	FINAL COVER SYSTEM GRADING PLAN, PONDS 1N & 1S
CSK-007	FINAL COVER SYSTEM SECTIONS & DETAILS

LEGEND	
——585——	MAJOR CONTOUR
——584——	MINOR CONTOUR
– – ◄ – –	DRAINAGE PATH

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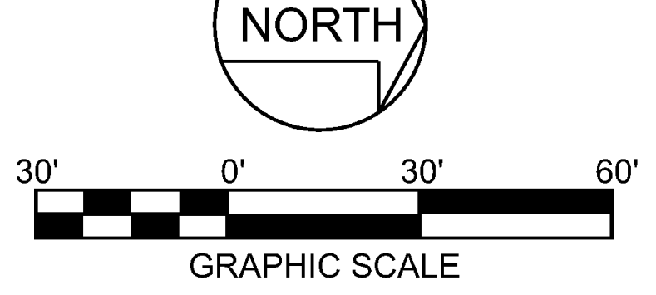

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REVIEWED BY:	T. DEHLIN
APPROVED BY:	T. DEHLIN

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MWG
Midwest Generation, LLC

PROJECT

WILL COUNTY
GENERATING STATION
CLOSURE OF PONDS
1N, 1S, 2S, AND 3S

DRAWING TITLE

FINAL COVER SYSTEM GRADING PLAN
PONDS 2S & 3S

DRAWING NUMBER				REVISION
WC-APC-CSK-006				0
SHEET	1	OF	1	

7/28/2023 12:25:25 PM
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Form GDG-0401-01-08, ANSI (Imperial) MicroStation Border - Size E - 34 x 44
Revision 11A, Revision Date: 04-30-2010

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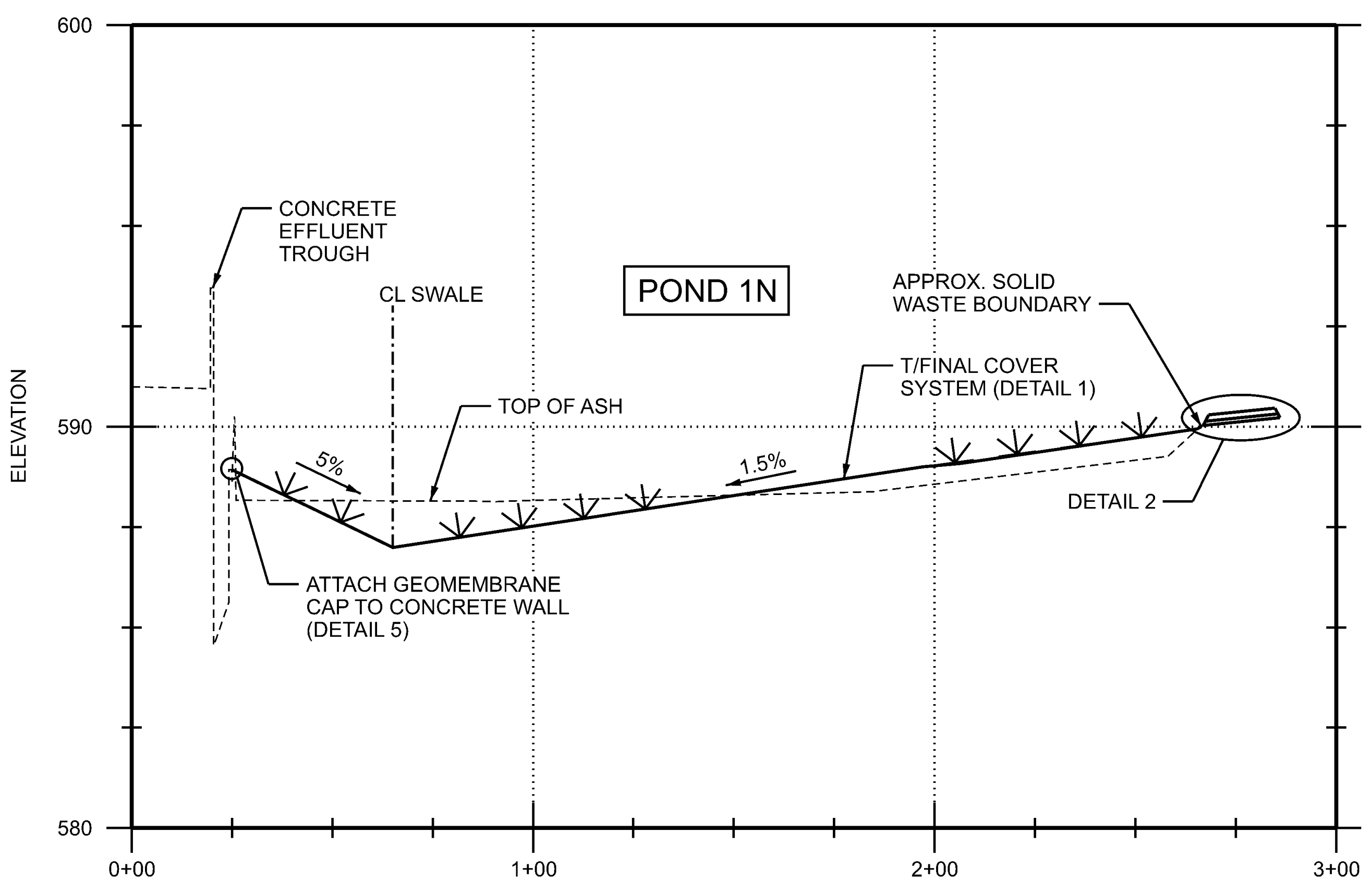
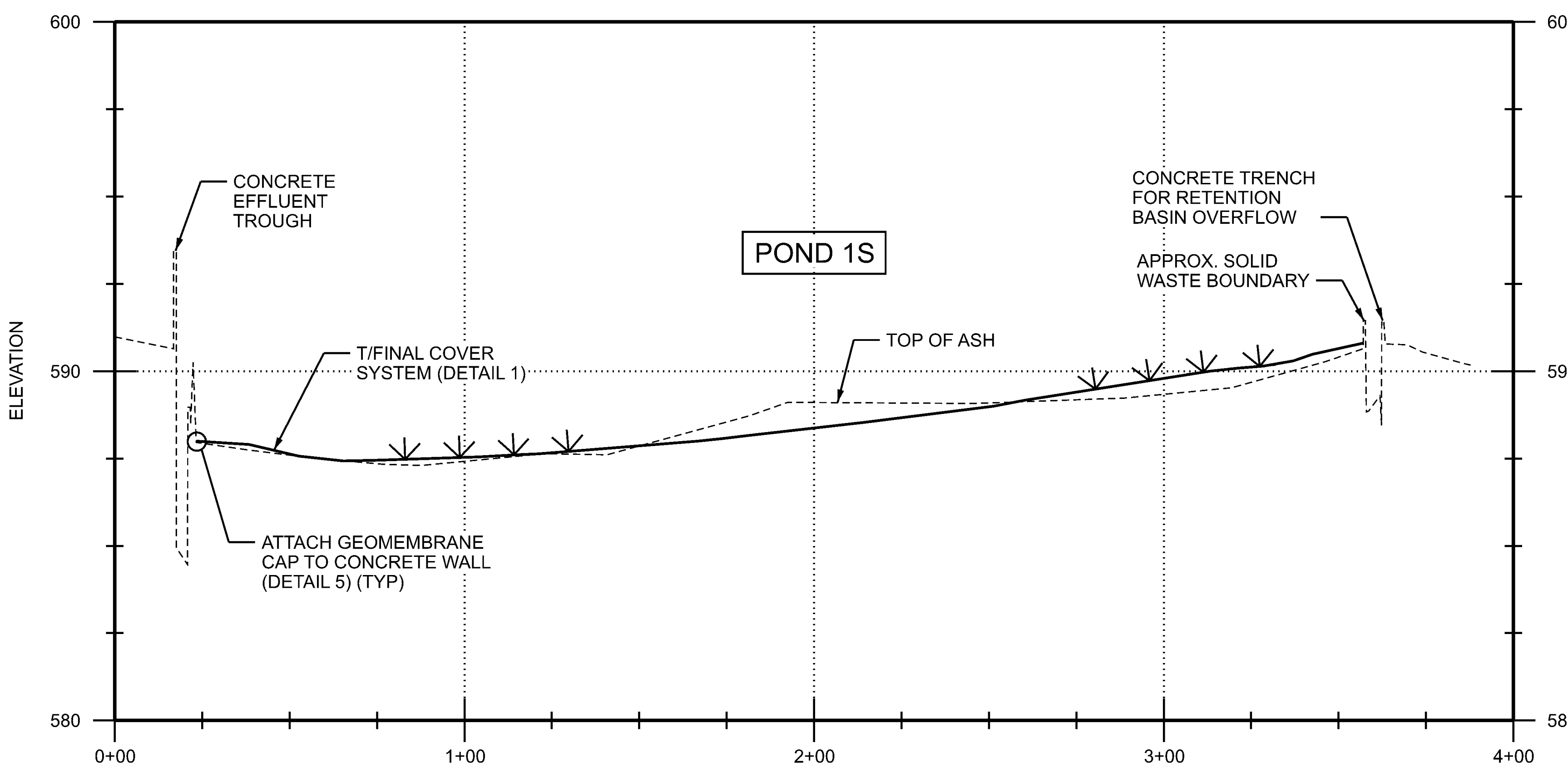


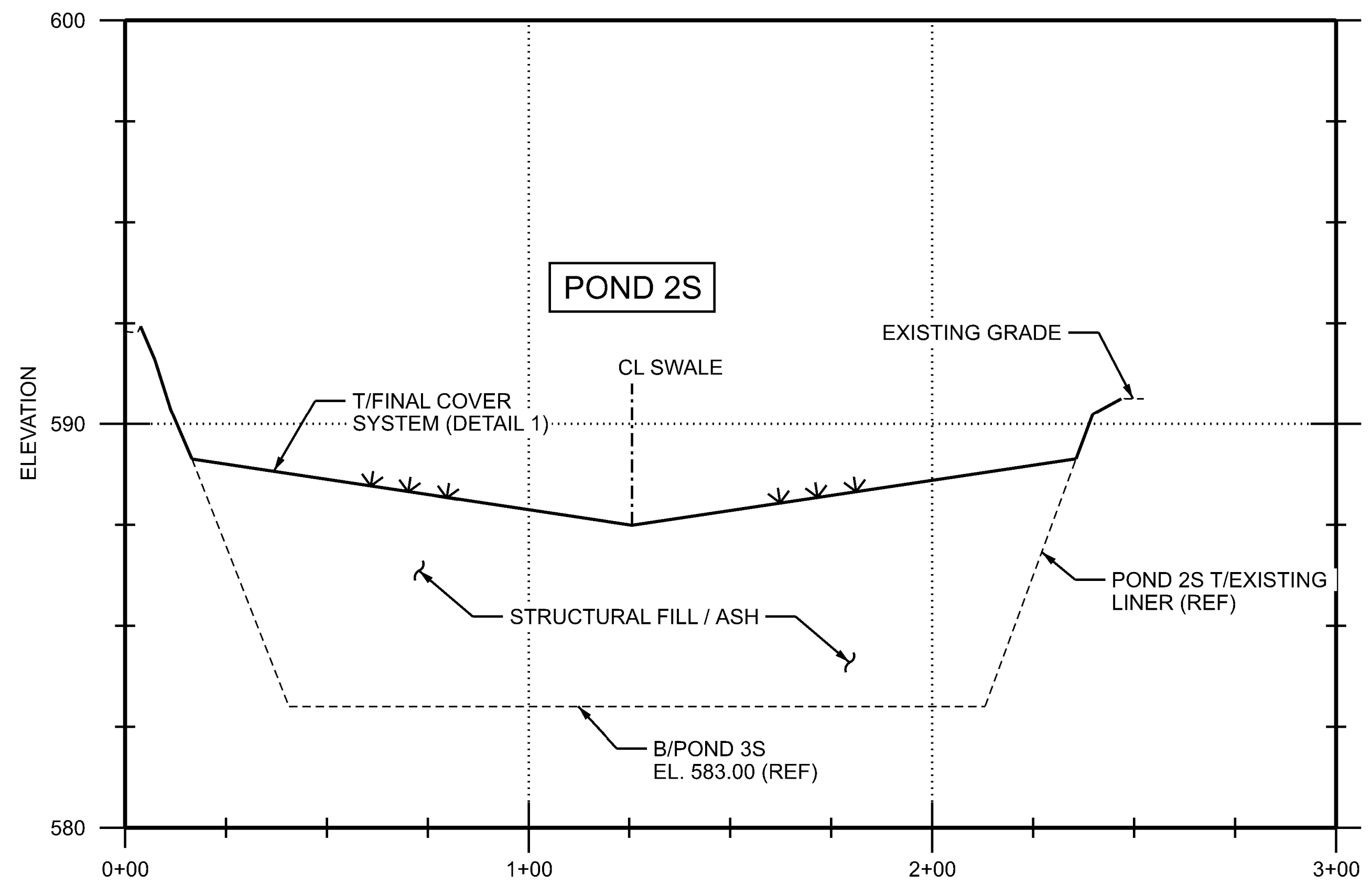
SECTION A

HORIZONTAL SCALE 1"=50'
VERTICAL SCALE 1"=5'
(CSK-005)



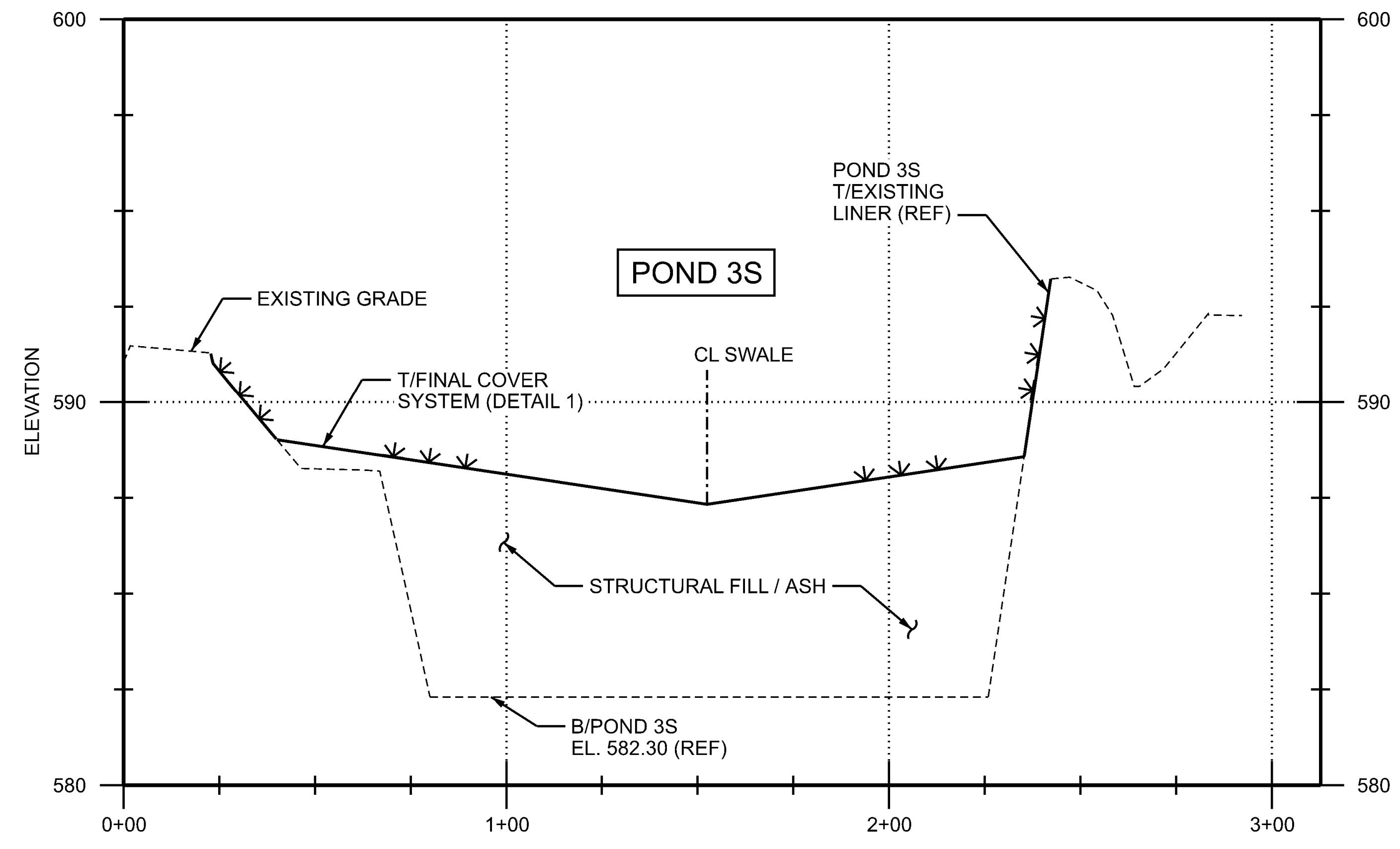
SECTION B

HORIZONTAL SCALE 1"=50'
VERTICAL SCALE 1"=5'
(CSK-005)



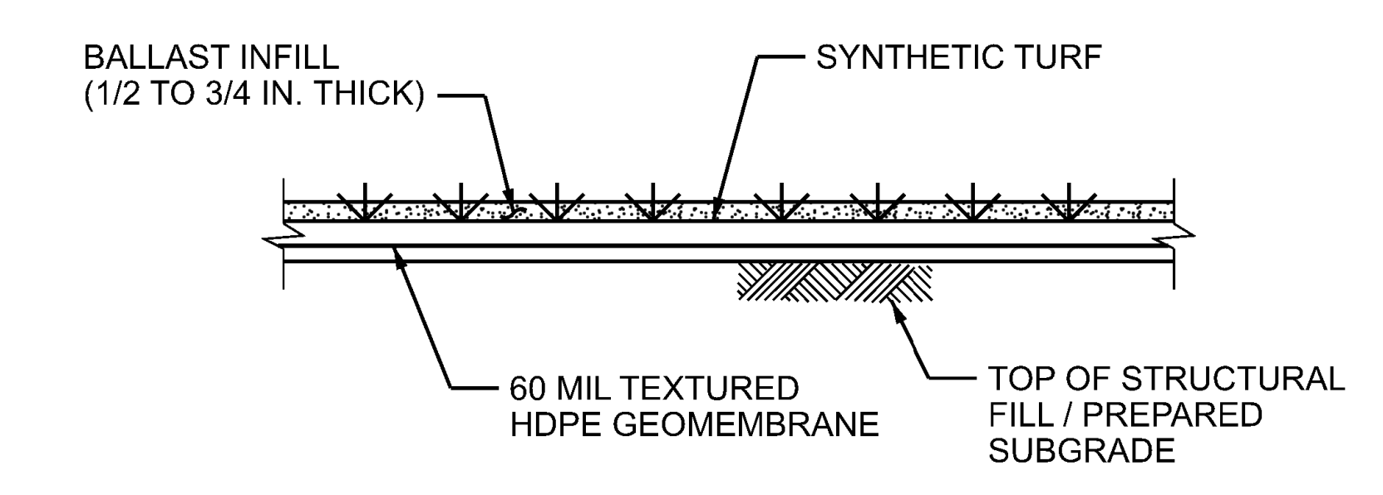
SECTION C

HORIZONTAL SCALE 1"=40'
VERTICAL SCALE 1"=5'
(CSK-006)



SECTION D

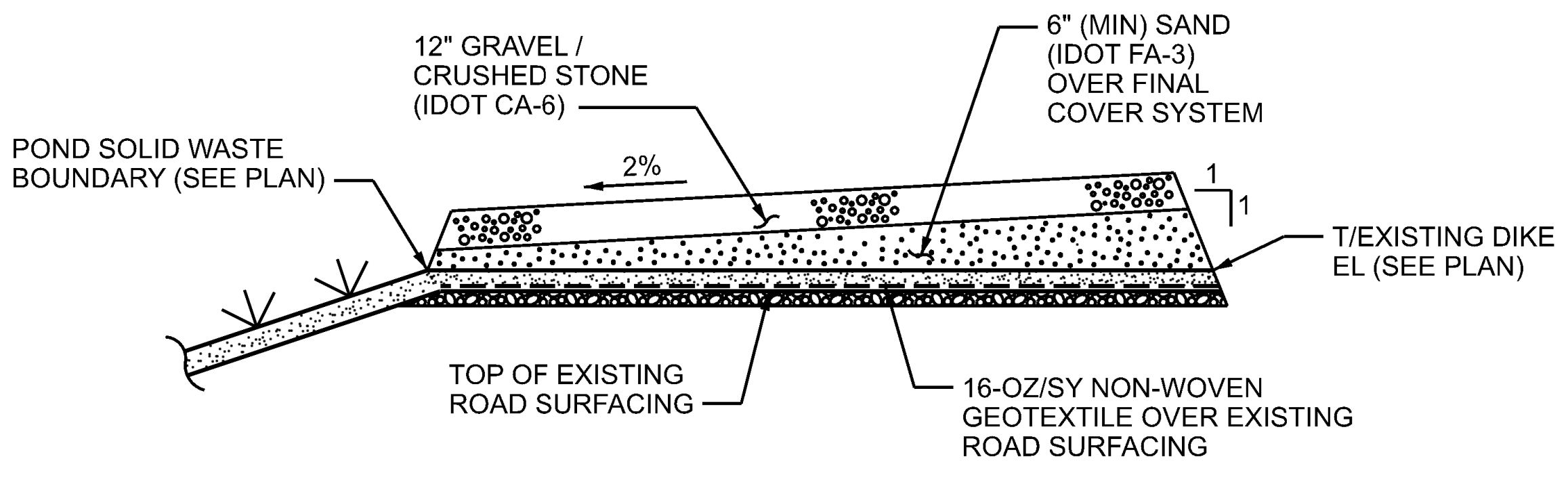
HORIZONTAL SCALE 1"=40'
VERTICAL SCALE 1"=5'
(CSK-006)



CLOSURETURF FINAL COVER SYSTEM

DETAIL 1

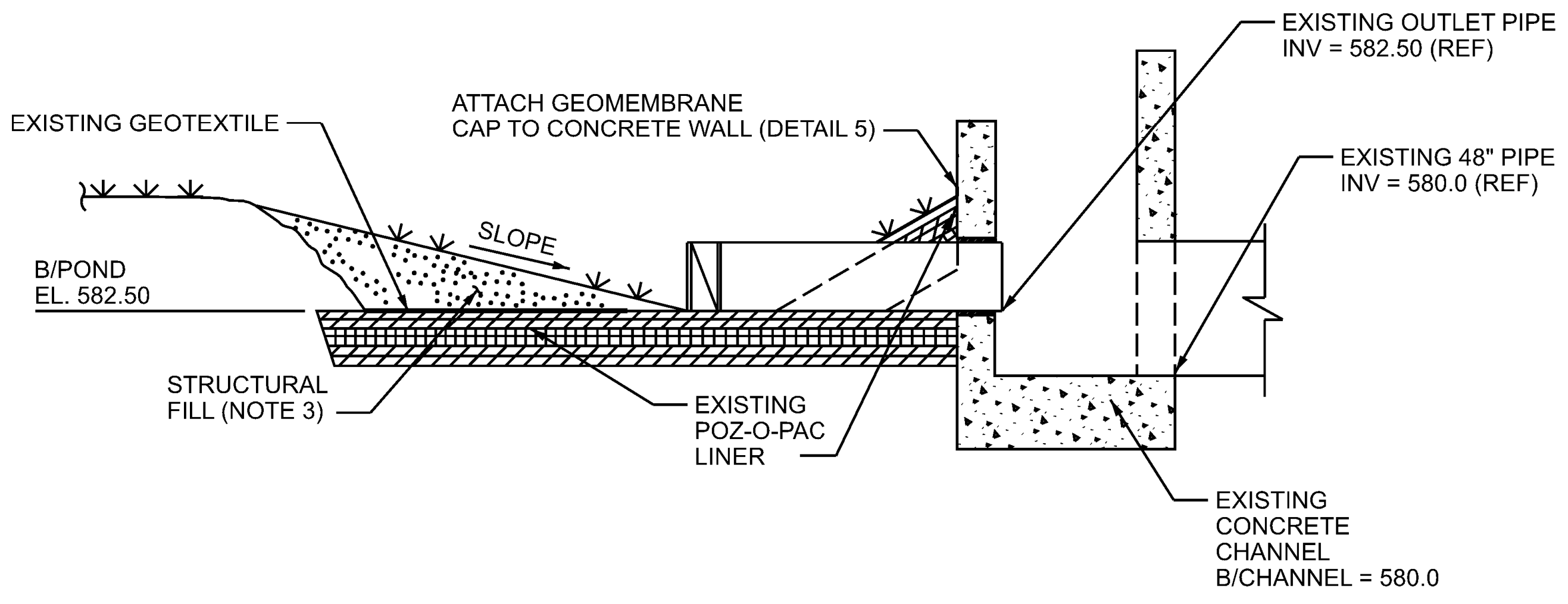
N.T.S.



FINAL COVER SYSTEM OVER EXTERIOR DIKE

DETAIL 2

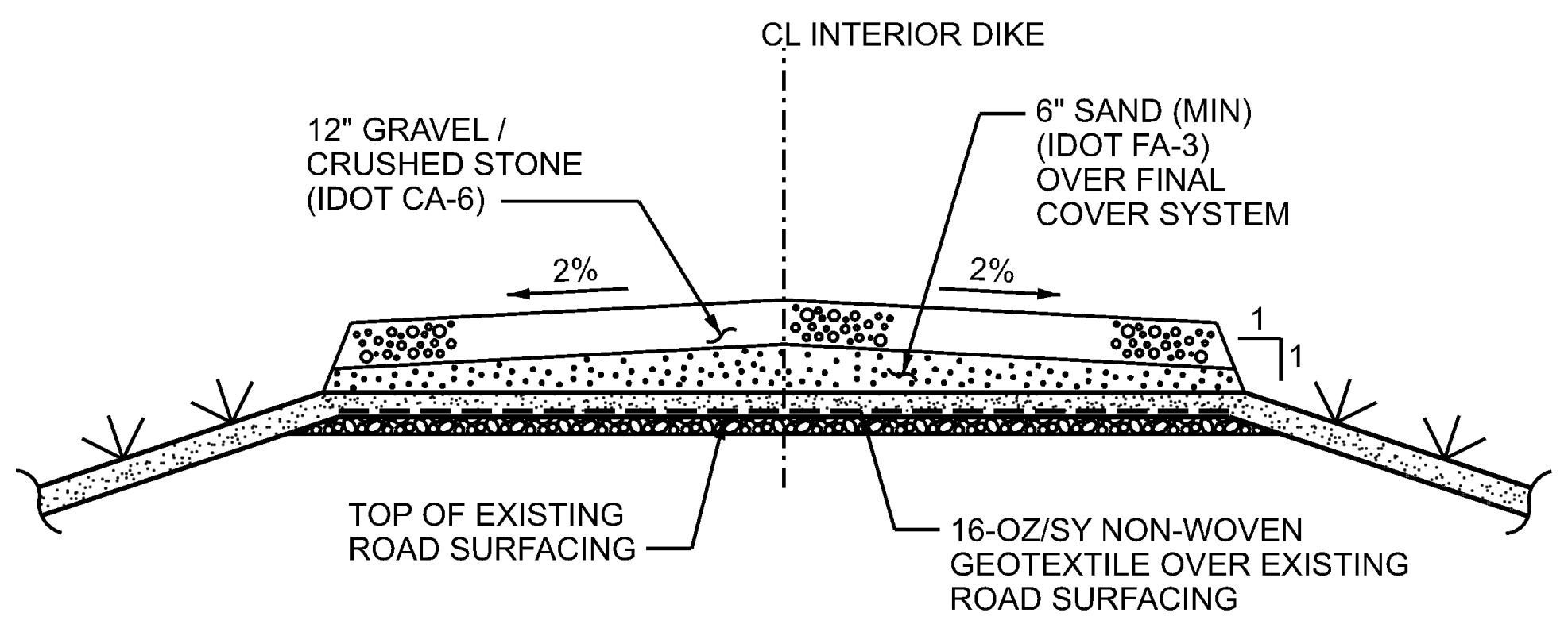
N.T.S.



FINAL COVER SYSTEM AT OUTLET AREAS FOR PONDS 1N & 1S

DETAIL 3

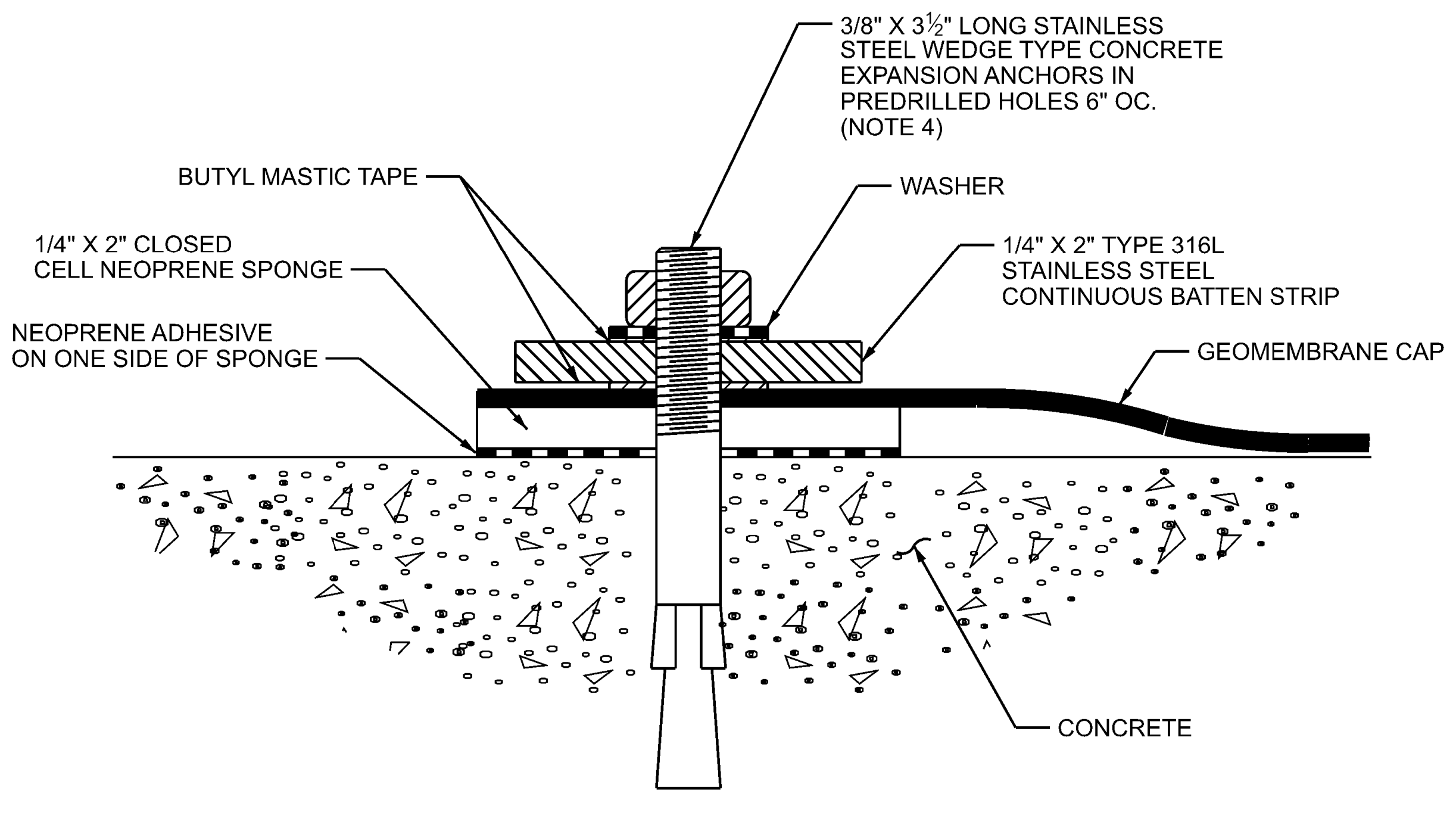
N.T.S.



FINAL COVER SYSTEM OVER INTERIOR DIKE

DETAIL 4

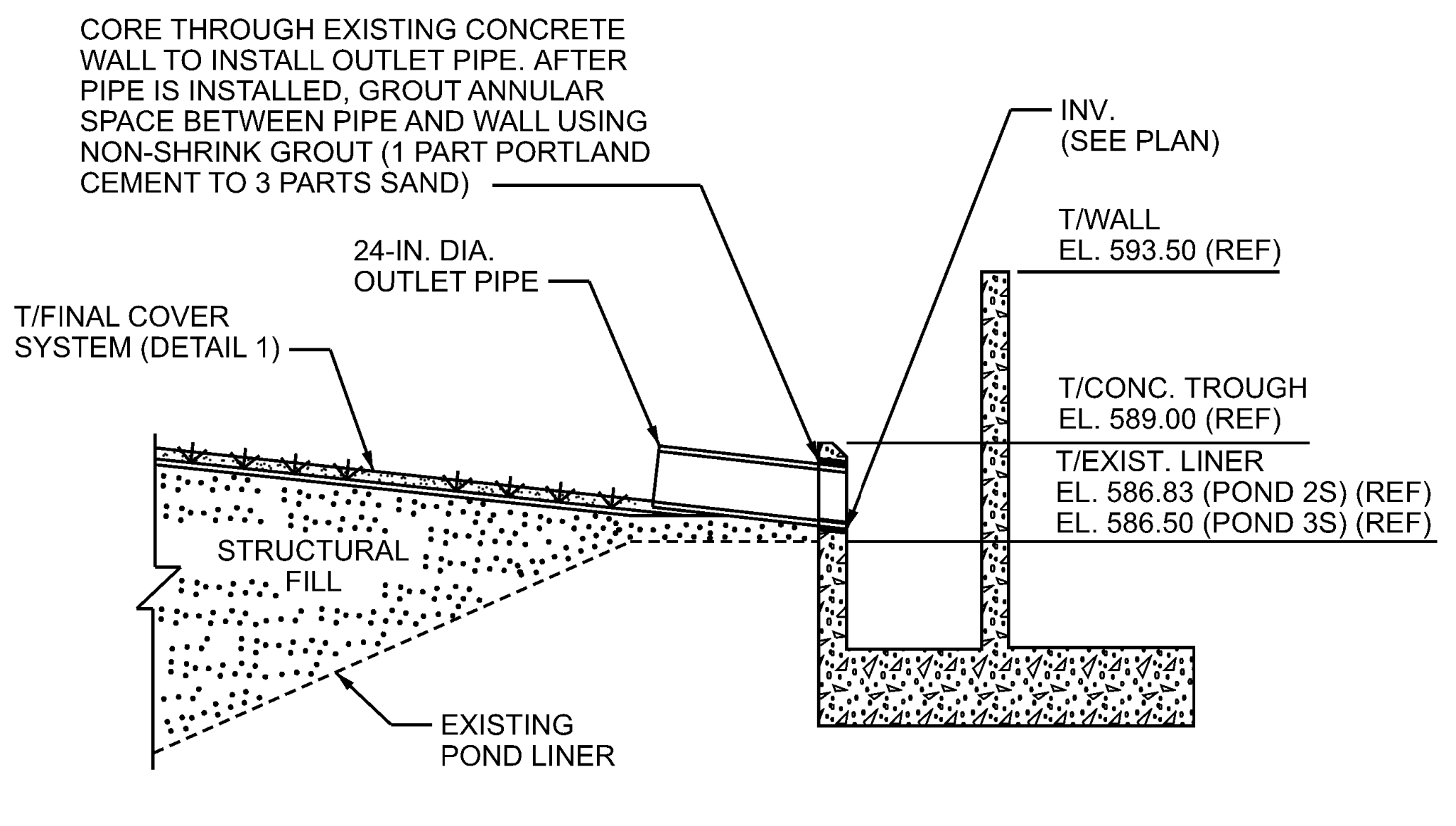
N.T.S.



ANCHORING GEOMEMBRANE CAP TO CONCRETE STRUCTURE

DETAIL 5

N.T.S.



NEW OUTLET PIPE FOR PONDS 2S AND 3S

DETAIL 6

N.T.S.

NOTES

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2. FOR GENERAL NOTES, ABBREVIATIONS, AND SYMBOLS, SEE DRAWING WC-APC-CSK-002.
3. WHERE RIPRAP HAS BEEN REMOVED IN OUTLET AREAS FOR PONDS 1N AND 1S (SEE DRAWING WC-APC-CSK-003), PLACE STRUCTURAL FILL AS REQUIRED TO ESTABLISH SLOPE TOWARDS OUTLET PIPE.
4. WEDGE TYPE CONCRETE EXPANSION ANCHORS SHALL BE HILTI KWIK BOLT 3 EXPANSION ANCHORS OR OWNER-APPROVED EQUAL.

REFERENCE DRAWINGS

C-4	ASH PONDS 1N & 1S MODIFICATIONS, SITEWORK DETAILS
869D1-C27	EFFLUENT TROUGHS - SHEET 2
D21131C031-03	SOUTH ASH POND 2 LINER REPLACEMENT, DETAILS AND SECTIONS
D1900C031-04	SOUTH ASH POND LINER REPLACEMENT, DETAILS AND SECTIONS

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WILL COUNTY
GENERATING STATION
CLOSURE OF PONDS
1N, 1S, 2S, AND 3S

DRAWING TITLE

FINAL COVER SYSTEM
SECTIONS & DETAILS

DRAWING NUMBER: WC-APC-CSK-007
REVISION: 0
SHEET 1 OF 1

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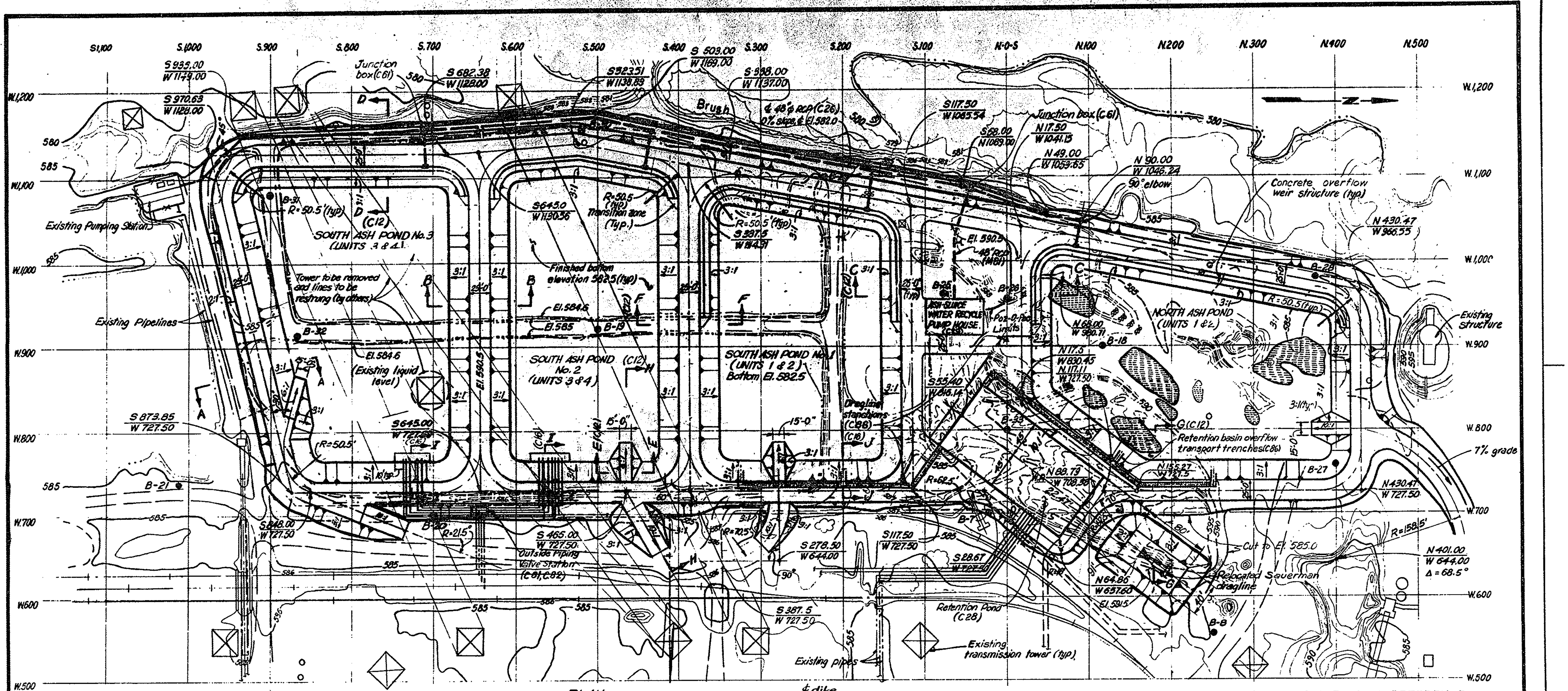
ATTACHMENT 2

REFERENCE DRAWINGS

ATTACHMENT 2-1

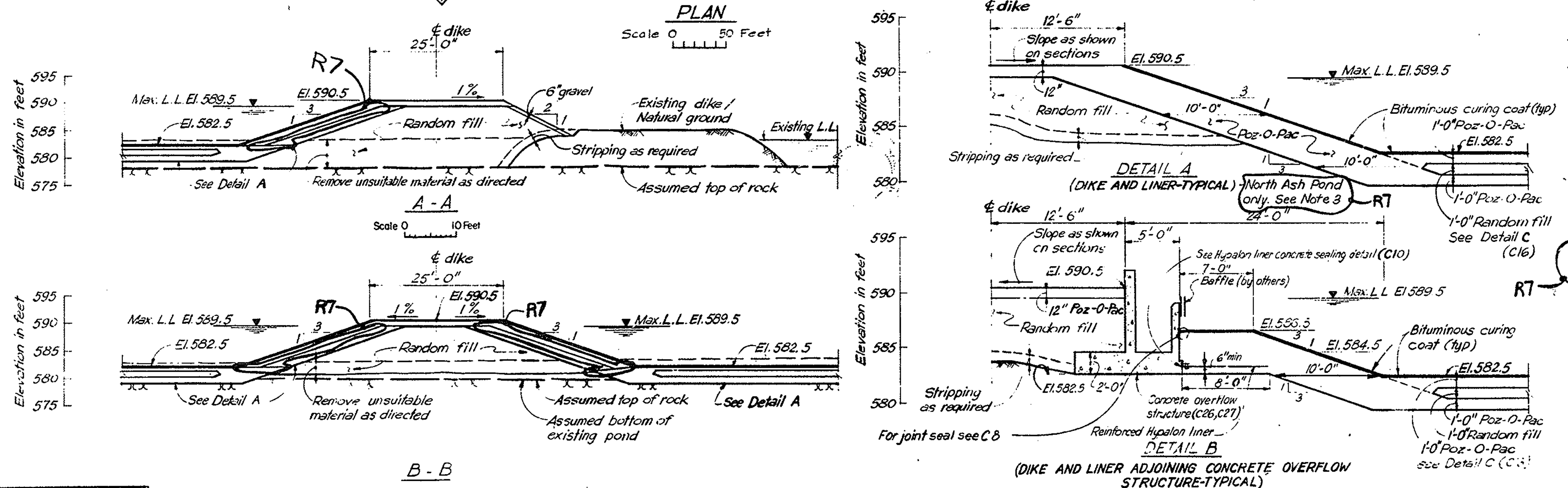
1977 CONSTRUCTION DRAWINGS

DRAWING NO.	TITLE
869D1-C11	ASH PONDS
869D1-M7	SITE PLAN – GENERAL ARRANGEMENT – SHEET 1 OF 2
869D1-C12	ASH POND SECTIONS
869D1-C16	ASH POND SECTIONS & DETAILS
869D1-C26	ASH SLUICE PONDS, UNITS 1, 2, 3, & 4 – EFFLUENT TROUGHS – SHEET 1



PLAN

Scale 0 50 Feet



A - A

Scale 0 10 Feet

B - B

Scale 0 10 Feet

DETAIL A

(DIKE AND LINER-TYPICAL)

DETAIL B

(DIKE AND LINER ADJOINING CONCRETE OVERFLOW STRUCTURE-TYPICAL)

PLAN AND ELEVATION REFERENCE:

1. Coordinate system based on Illinois State Plane Coordinate System.
2. Topography prepared by Aero-Metric Engineering, Inc.
3. Elevation datum based on Mean Sea Level

LEGEND:

●	B-8 Borings
- - - - -	New buried pipes
———	New uncovered pipes
▨	Concrete trench
▨	Clay pockets encountered during construction

NOTES:

1. Work this drawing with C1 thru C6c, C10, C12, C[illegible], C61, C81, C82
2. For pipe locations, see dwgs. M80, M81
3. See section J-J on dwg. 869DI-C16 for typical slope dets. for South Ash Ponds. Work this drawing with 869DI-C16.

R7

Scale 0 5 10 Feet

REV. NO.	DWG. TRANSMITTAL LETTER NO.	DATE	NATURE OF REVISION	BY	CHKD.	APPD.
R7	DDR 869DI-C4 #83	8/14/79	Bottom ash/shot rock substituted for Poz-O-Pac	CLP	AJF	
R6	DDR 869DI-C4 #72	3-13-79	Clay pockets during construction	CW	AJF	YKC
R-5	DDR 869DI-C4 #43	10-13-78	Plan, detail B revised as shown	CW	AJF	YKC
R4	DDR 869DI-C4 #32	[illegible]-78	Plan revised as shown, Legend addition	MM/SE	AJF	YKC
R3	DDR 869DI-C4 #3	5-[illegible]-78	Issued to Construction 869DI-C6	RJM	AJF	YKC
R2	DDR 869DI-C4 #4	4/25/78	Fill & structures added as shown, details revised, and dwg references added	J.V.	AJF	YKC
R1	DDR 869DI-CA# 1	4/7/78	Issued for construction Contract 869DI-C4	M.M.	AJF	SEC
R0		12-12-77	Issued for Bids 869DI-C4	M.M.	AJF	WJM

		REVIEWED	
DSGN.	AJF		
CHKD.	WJM	CIVIL	YKC
DWN.	M.M.	MECH.	
CHKD.	[illegible]		
SUBM.	WJM	ELECT.	

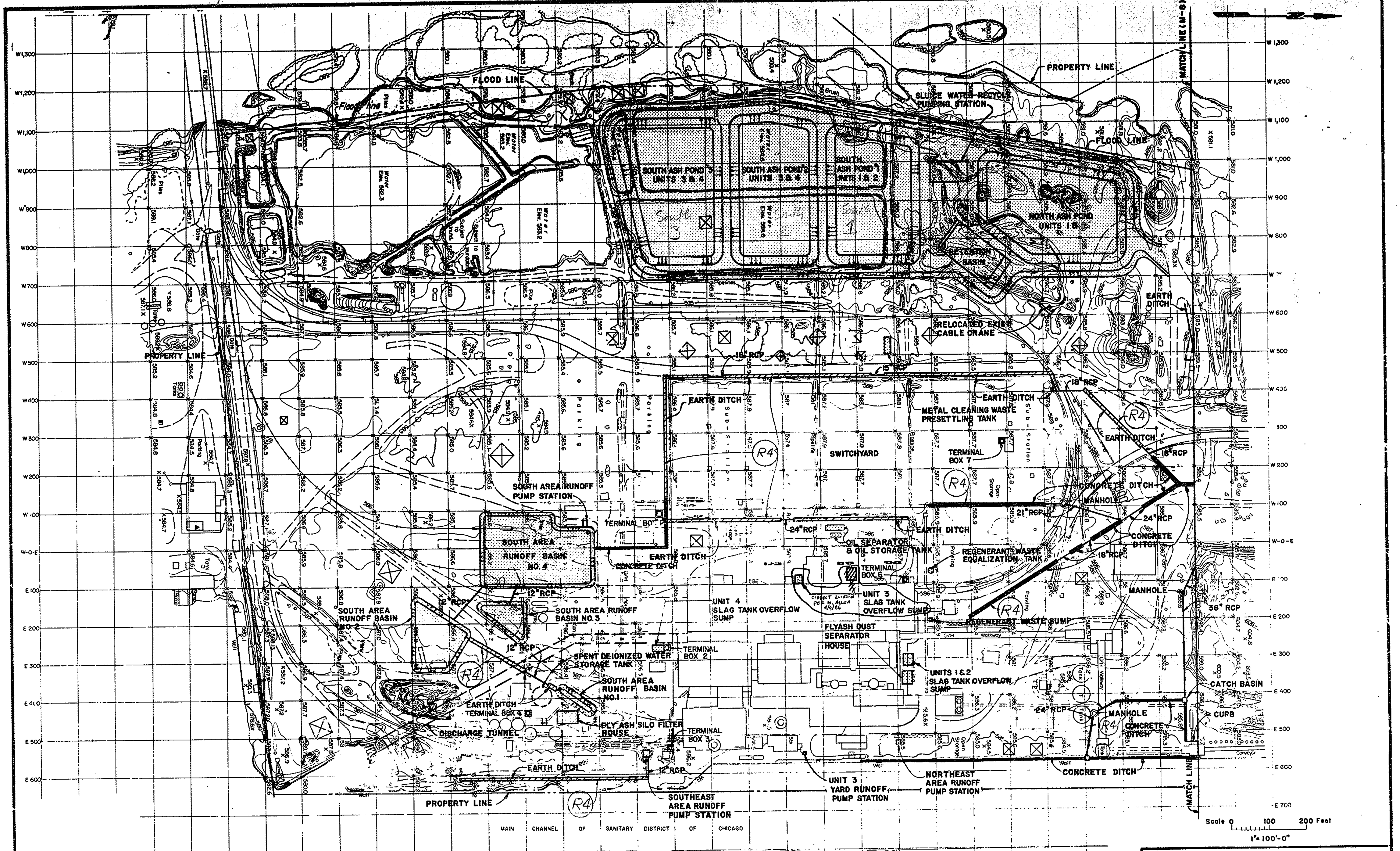
COMMONWEALTH EDISON COMPANY
CHICAGO, ILLINOIS

WILL COUNTY STATION | WASTEWATER TREATMENT

ASH PONDS

CONSULTING ENGINEERS
HARZA ENGINEERING COMPANY
APPROVED

CHICAGO, ILLINOIS | DATE NOV., 1977 | DWG.NO. 869 DI - C11



S 2,200 S 2,100 S 2,000 S 1,900 S 1,800 S 1,700 S 1,600 S 1,500 S 1,400 S 1,300 S 1,200 S 1,100 S 1,000 S 900 S 800 S 700 S 600 S 500 S 400 S 300 S 200 S 100 S-0-N N 100 N 200 N 300

3 Basins feed into South Area Runoff Basin.
SAR Basin feeds to one of the Ash Ponds

NE Area Runoff
goes to N
area runoff
basin

DSGN.	F.F.	REVIEWED
CHKD.	F.C.	CIVIL	
DWN.	F.F.	MECH	JHF
CHKD.		ELECT.	
SUBM.			

REV. NO.	DATE	NATURE OF REVISION	BY	CHKD.	APPD.
R4	7-26-10	Revised type & location of ditches 86-01-C4	V.M.		
R3	5-2-78	Issued for construction: Contract 869DI-C6	R.L.	JHW	
R2	4-5-78	Issued for construction Contract 869DI-C4	F.S.	JHW	
R1	1-26-78	Issued for construction 869DI-C5 as reference	F.S.	JHW	
R.0	12-28-77	Issued for bid 869DI-C6			
R.0	12-12-77	Issued for bid 869DI-C4.			

COMMONWEALTH EDISON COMPANY
CHICAGO, ILLINOIS

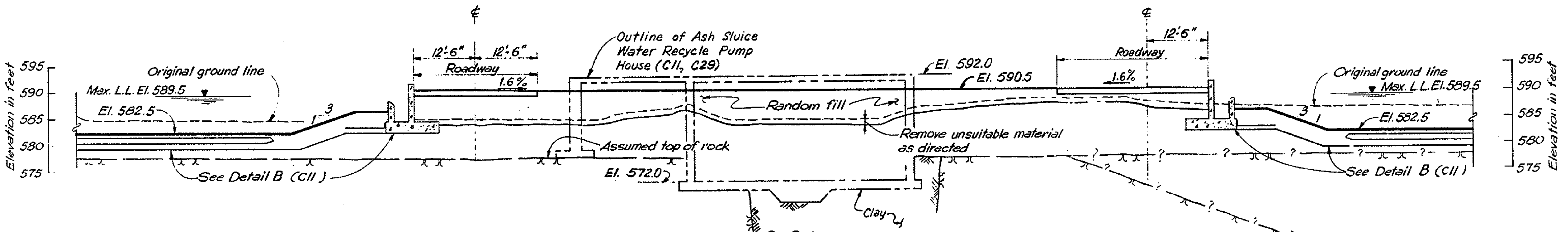
WILL COUNTY STATION | WASTEWATER TREATMENT

SITE PLAN-GENERAL ARRANGEMENT
SHEET 1 OF 2

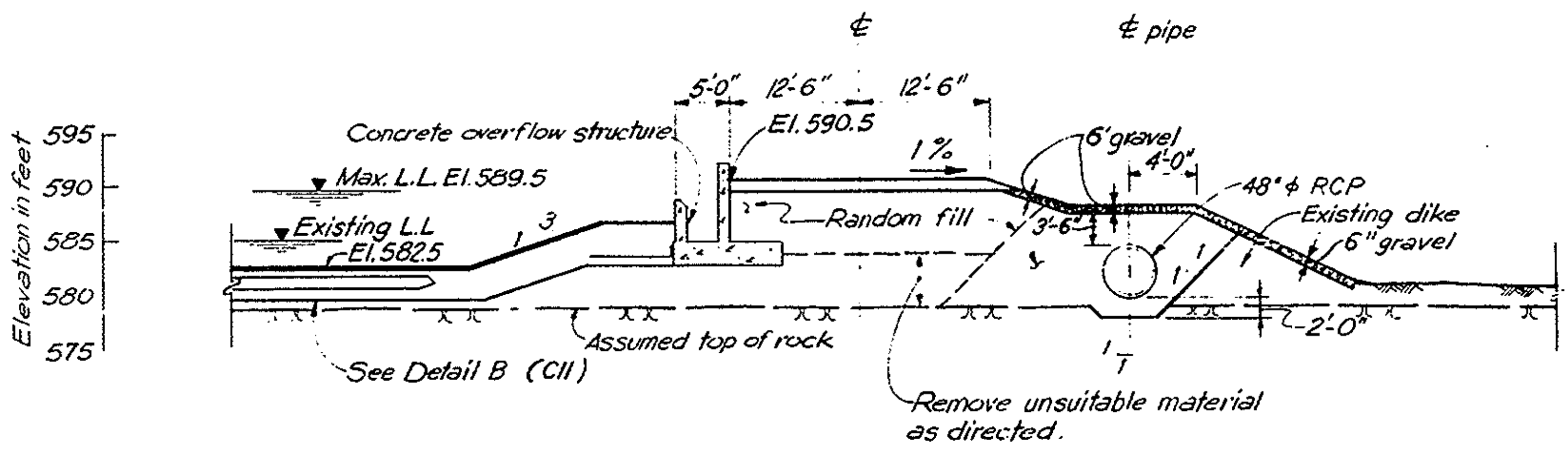
HARZA ENGINEERING COMPANY
APPROVED

CHICAGO, ILLINOIS	DATE APRIL 1977	DWG. NO. 869DI M-7

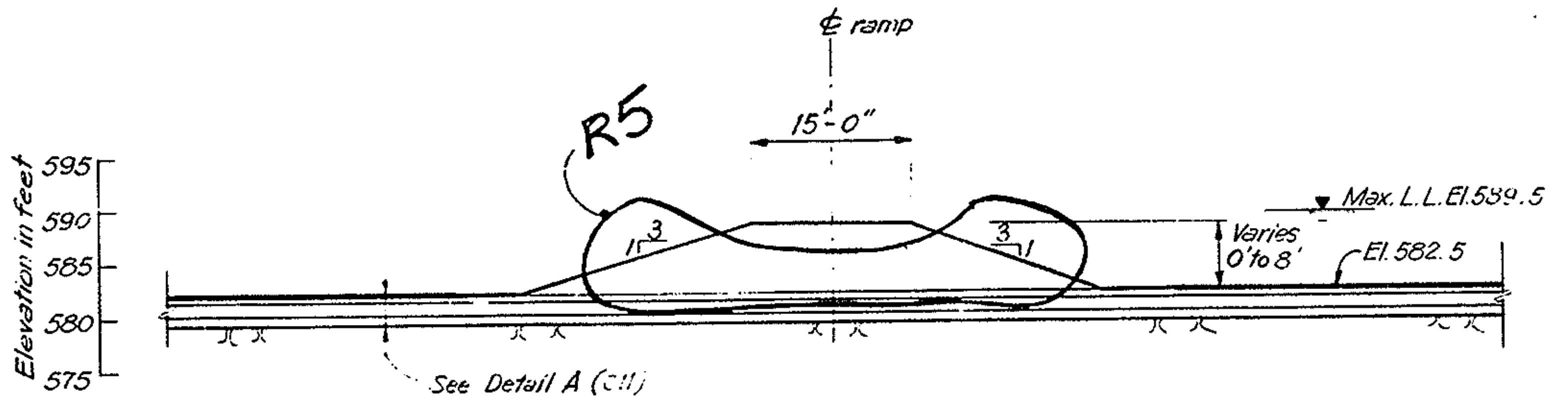
DDR 869DI-C6 #16



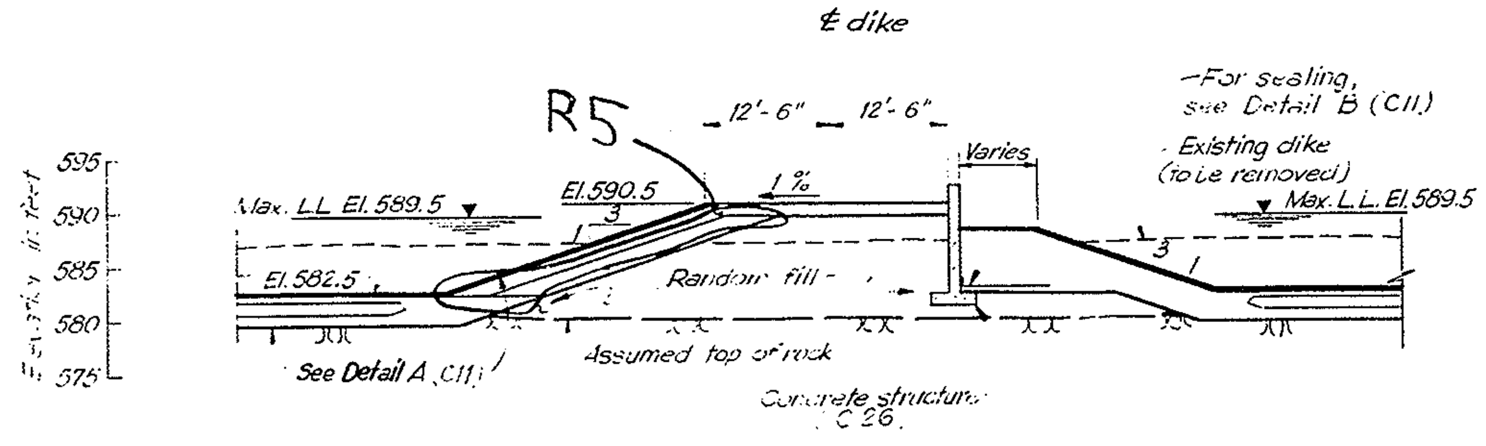
C - C (C11)



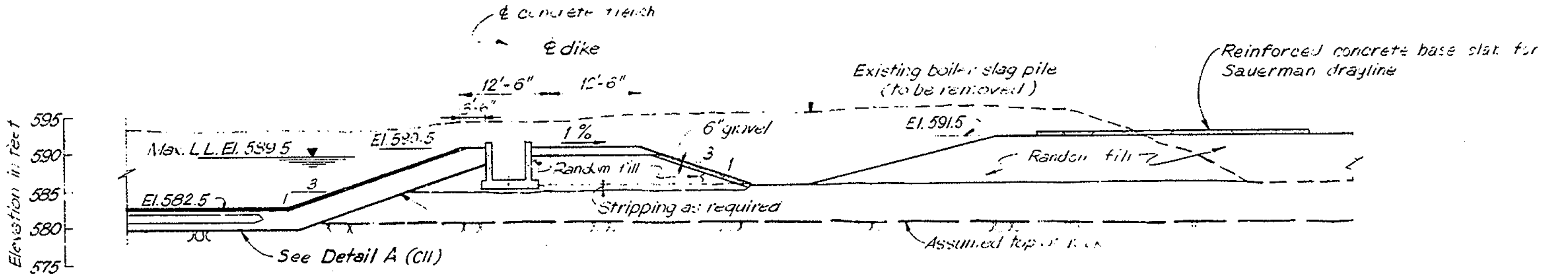
D - D (C11)



E - E (C11)



F - F (C11)

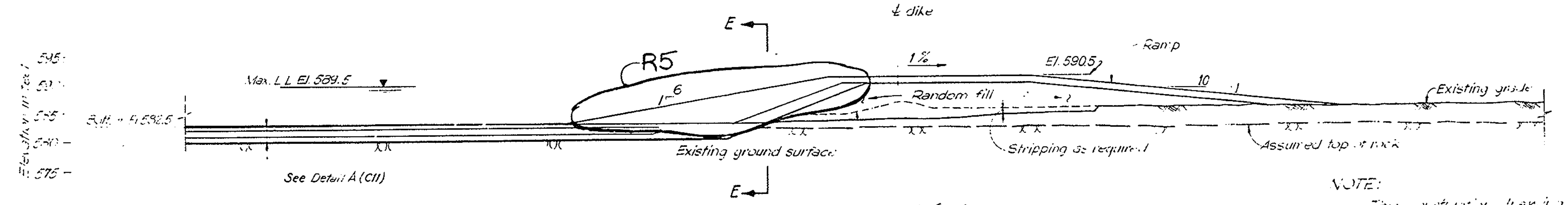


G - G (C11)

NOTE:

1. Work this drawing with C1 thru C6, C8, ...
2. Work this drawing with 869DI-C16

R5



H - H (C11)

NOTE:

This construction drawing 869DI-C12 replaces dwg 869 DI-C12 [illegible]

DSGN	AJF	REVIEWED	
CHKD	WJM	CIVIL	[illegible]
DWN	M.M.	MECH	
CHKD.	AJF	ELECT	
SUBM.	[illegible]		

REV. NO.	DWG. TRANSMITTAL LETTER NO.	DATE	NATURE OF REVISION	BY	CHKD.	APPD.
R5	[illegible]	8/14/79	Bottom ash/shot rock substituted for Poz-O-Pac.	CLP	AJF	[illegible]
R4	[illegible]	[illegible]	Sect. C-C, E-E & H-H revised	JLW	AJF	[illegible]
R3	DLF Sec. D-C4-32	8/25/78	Sect. C-C, D-D, E-E, G-G & H-H revised	J.M./S.F.	AJF	[illegible]
R2	[illegible]	4/25/78	Sections F-F and D-D revised	J.V.	AJF	[illegible]
R1		4.5.78	Issued for Construction Contract 869 DI-C4	[illegible]	AJF	[illegible]
R0		12-12-77	Issued for Bids 869 DI-C4	[illegible]	AJF	[illegible]

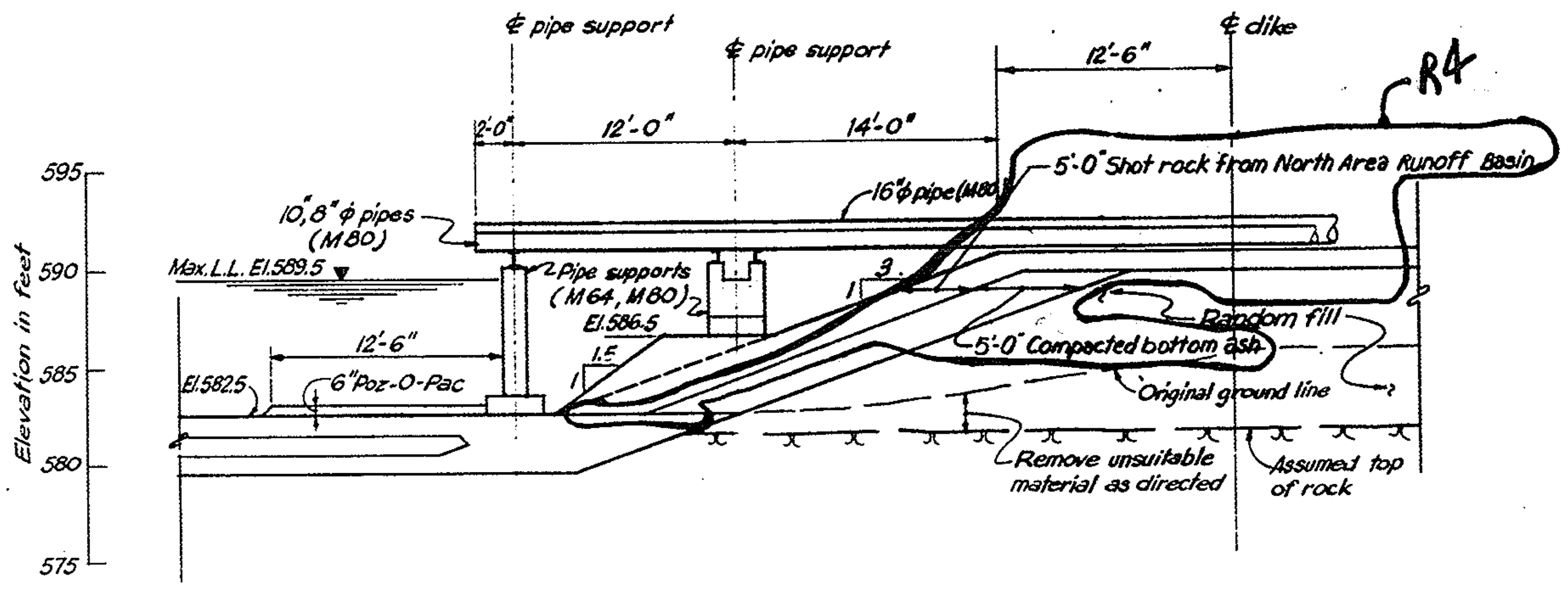
COMMONWEALTH EDISON COMPANY
CHICAGO, ILLINOIS

WILL COUNTY STATION | WASTEWATER TREATMENT

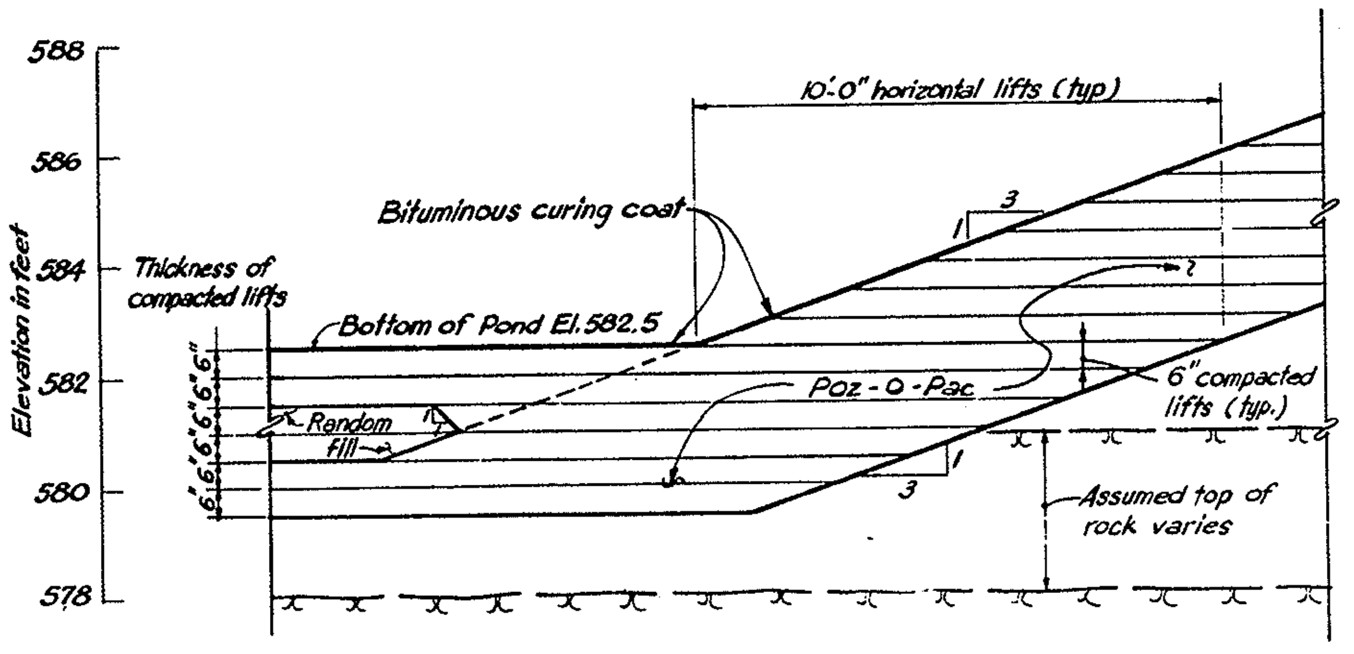
ASH POND SECTIONS

CONSULTING ENGINEERS
HARZA ENGINEERING COMPANY
APPROVED

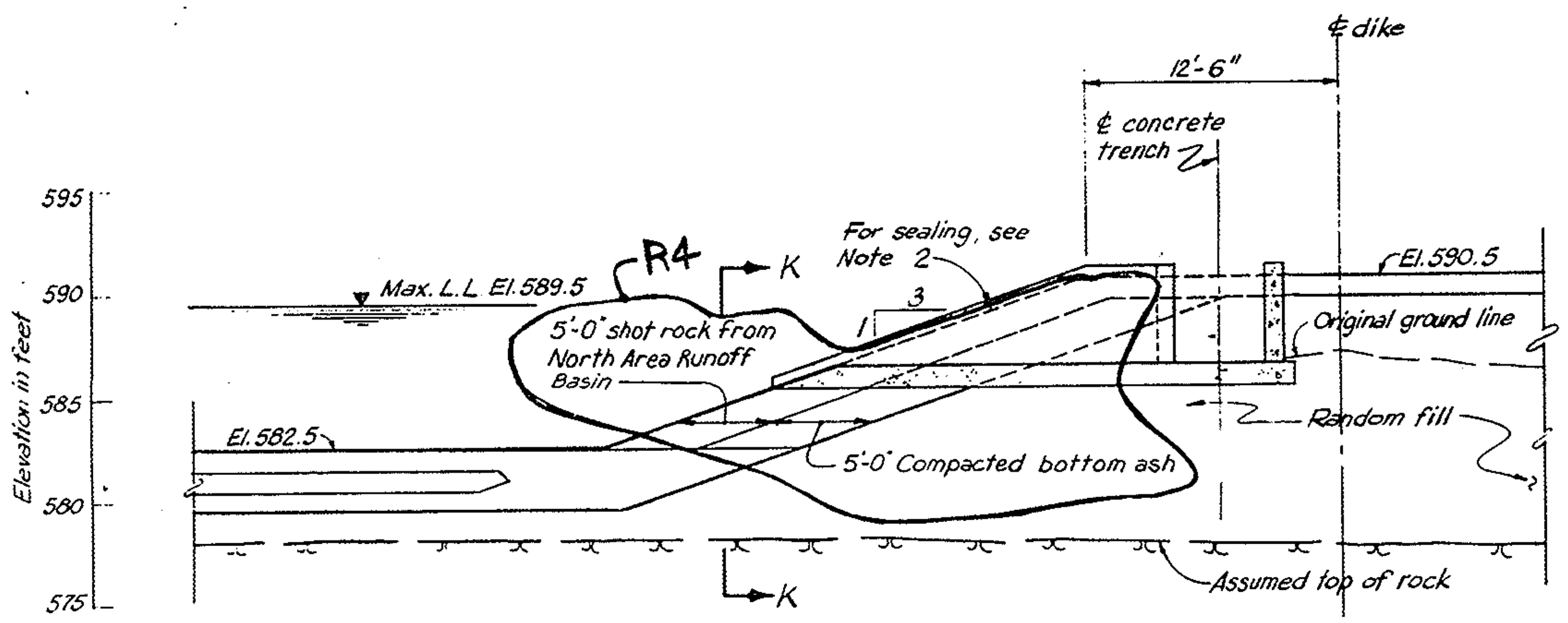
CHICAGO, ILLINOIS
DATE NOV., 1977
DWG.NO. 869-DI-C12



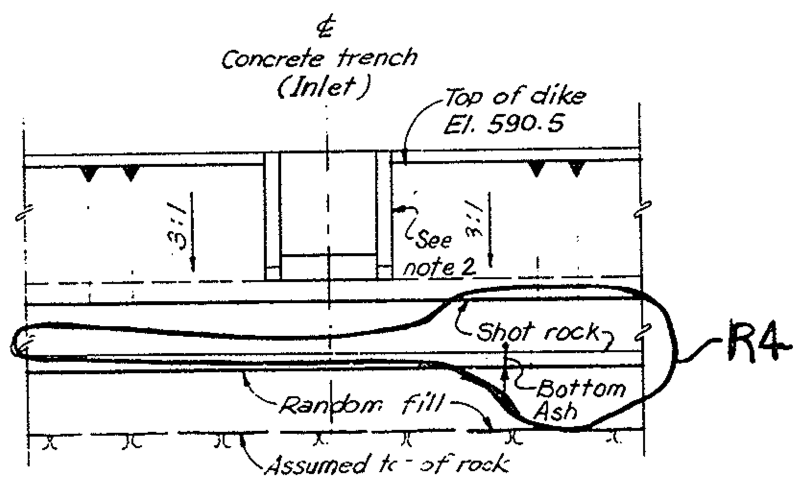
I - I (C11)
Scale 0 5 Feet



DETAIL C
(POZ-O-PAC PLACEMENT IN ASH POND)
Scale 0 2 Feet



J - J (C11)
Scale 0 5 Feet



K - K
Scale 0 5 Feet

NOTES:

1. Work this drawing with C1 thru C6c, C11 and C12.
2. Apply joint sealant as directed by the Owners Representative, at concrete/Poz-O-Pac joints.

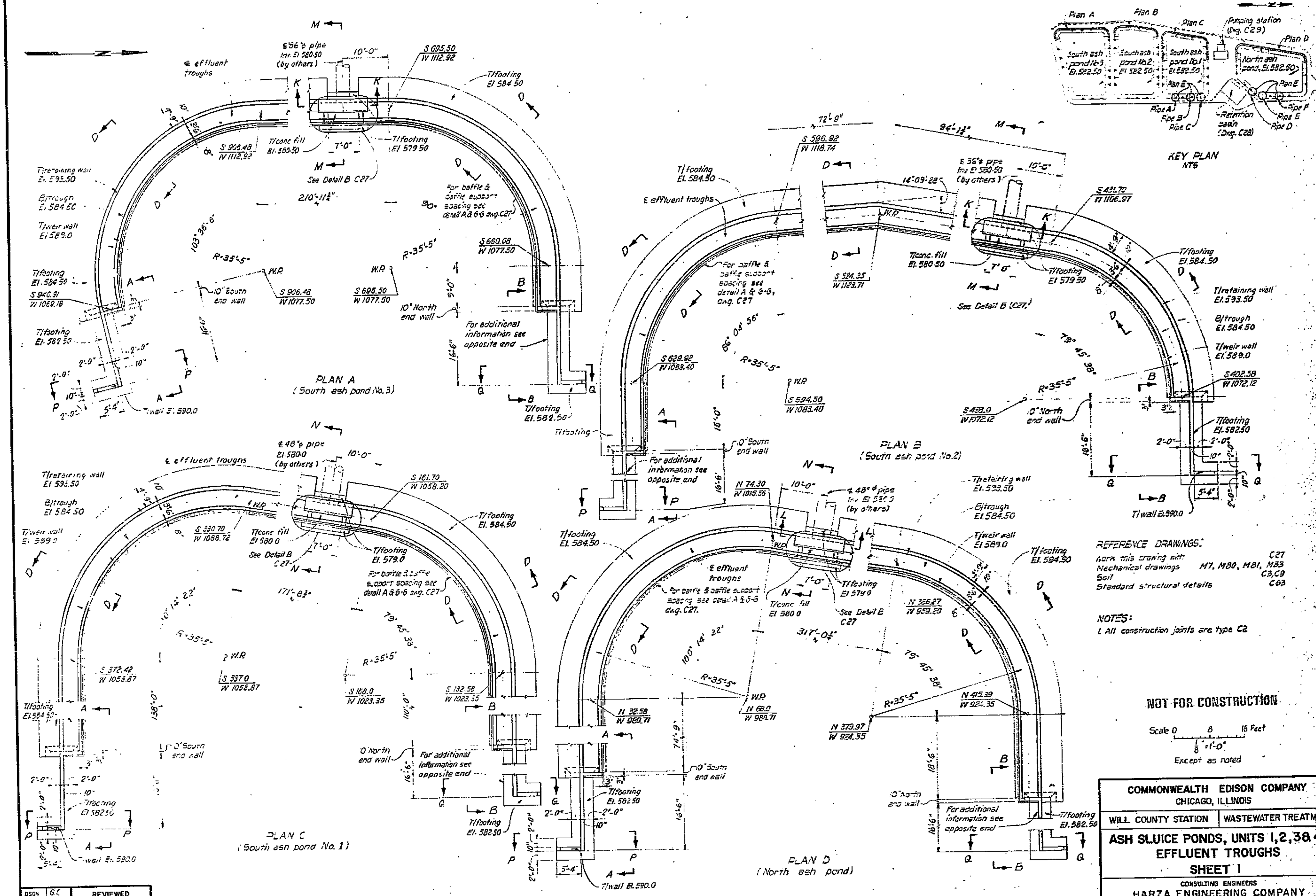
REV. NO.	DWG. TRANSMITTAL LETTER NO.	DATE	NATURE OF REVISION	BY	CHKD.	APPD.
R4	DLR 869 DI-C4 #33	8/14/79	Bottom ash/shot rock substituted for Poz-O-Pac.	CLP	AJF	[illegible]
R3	DDR 869 DI-C4 #32	8/25/78	Sections and details revised as shown	M.M.	AJF	[illegible]
R2	DDR 869 DI-C4 #4	4/25/78	Details and sections revised as shown	J.V.	AJF	[illegible]
R1		4/5/78	Issued for construction contract 869 DI-C4	M.M.	AJF	[illegible]

		REVIEWED	
DSGN.	AJF	CIVIL	
CHKD	M.M.	MECH.	
DWN.		ELECT.	
CHKD.	AJF		
SUBM.	A F		

COMMONWEALTH EDISON COMPANY
CHICAGO, ILLINOIS
WILL COUNTY STATION | WASTEWATER TREATMENT

ASH POND SECTIONS & DETAILS

CONSULTING ENGINEERS
HARZA ENGINEERING COMPANY
APPROVED
CHICAGO, ILLINOIS
DATE APRIL, 1978
DWG. NO. 869 DI - C16



REFERENCE DRAWINGS:

Work this drawing with	C27
Mechanical drawings	M7, M80, M81, M83
Soil	C3, C9
Standard structural details	C63

NOTES:

1. All construction joints are type C2

NOT FOR CONSTRUCTION

Scale 0 8 16 Feet
1/8"=1'-0"
Except as noted

R0		12/27/7?	issued for bids 869 DI-C4			
REV. NO.	DWG. TRANSMITTAL LETTER NO.	DATE	NATURE OF REVISION	BY	CHKD.	APPD.

DSGN.	G.C.	REVIEWED	
CHKD.	J.B.A.	C VIL	
DWN.	G.A.H.		
CHKD.	FS/VK	MECH.	
SUBM.		ELECT.	

COMMONWEALTH EDISON COMPANY
CHICAGO, ILLINOIS

WILL COUNTY STATION | WASTEWATER TREATMENT

ASH SLUICE PONDS, UNITS 1,2,3&4
EFFLUENT TROUGHS
SHEET 1

CONSULTING ENGINEERS
HARZA ENGINEERING COMPANY
APPROVED

CHICAGO, ILLINOIS | DATE NOV.1977 | DWG.NO. 869DI-C26

JAN 13 1978 C4

ATTACHMENT 2-2

2013 POND 2S LINER REPLACEMENT DRAWINGS

DRAWING NO.	TITLE
D21131TS-03	TITLE SHEET
D21131C010-03	PRE-CONSTRUCTION SITE CONDITIONS
D21131C020-03	LINER SUBGRADE PREPARATION
D21131C021-00	GEOMEMBRANE PANEL LAYOUT
D21131C030-02	GEOCELL AND WARNING LAYER PLAN
D21131C031-03	DETAILS AND SECTIONS
D21131C032-03	GEOCELL DETAILS AND SECTIONS

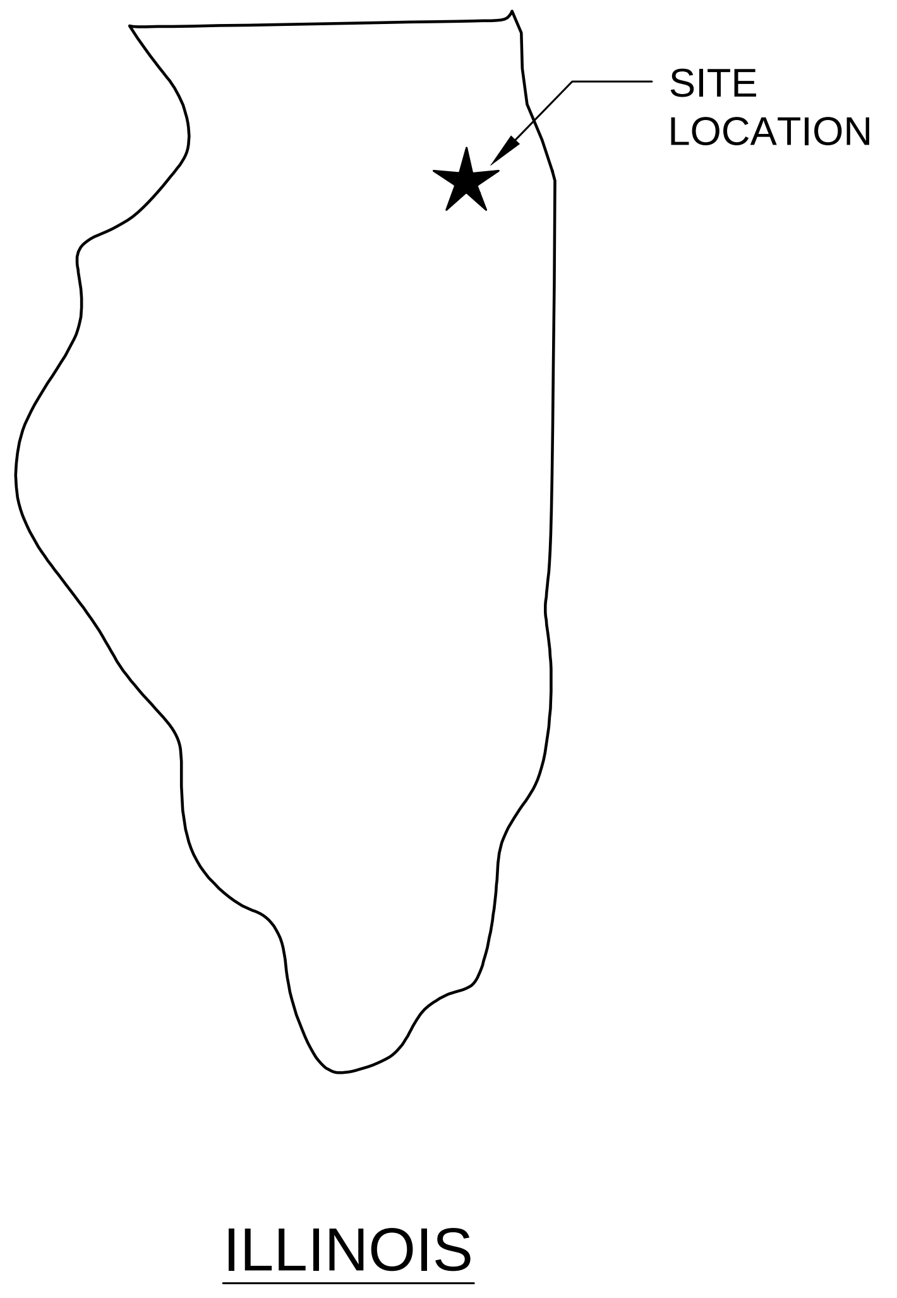
SOUTH ASH POND 2 LINER REPLACEMENT
WILL COUNTY GENERATING STATION
MIDWEST GENERATION
ROMEOVILLE, WILL COUNTY, ILLINOIS

LIST OF DRAWINGS

SHEET NO.	TITLE	DRAWING NO.
TS	TITLE SHEET	D21131TS-03
C010	PRE-CONSTRUCTION SITE CONDITIONS	D21131C010-03
C020	LINER SUBGRADE PREPARATION	D21131C020-03
C021	GEOMEMBRANE PANEL LAYOUT	D21131C021-00
C030	GEOCELL AND WARNING LAYER PLAN	D21131C030-03
C031	DETAILS AND SECTIONS	D21131C031-03
C032	GEOCELL DETAILS AND SECTIONS	D21131C032-03

RECORD DRAWING LEGEND

~~PROPOSED~~	CROSSED OUT TEXT INDICATES CHANGES FROM THE FINAL DESIGN TO RECORD CONSTRUCTION
PRE-CONSTRUCTION	UNDERLINED TEXT INDICATES ADDED NOTES OR COMMENTS, AND DOCUMENTS CHANGES FROM THE FINAL DESIGN TO RECORD CONSTRUCTION
☁	"CLOUDS" DOCUMENT ADDITIONS AND/OR CHANGES FROM THE FINAL DESIGN TO RECORD CONSTRUCTION
✕	"CROSS OUTS" DOCUMENT OBJECTS REMOVED FROM THE FINAL DESIGN TO RECORD CONSTRUCTION



ILLINOIS

PREPARED FOR:

MIDWEST GENERATION, LLC
528 E. 135TH STREET
ROMEOVILLE, IL 60446

JULY 2014

TITLE SHEET

SOUTH ASH POND 2 LINER REPLACEMENT
WILL COUNTY GENERATING STATION
MIDWEST GENERATION
ROMEOVILLE, WILL COUNTY, ILLINOIS

SHEET NO. TS

DRAWING NO: D21131TS-03
REFERENCE: .

PROJECT NO. 2113.1
DRAWN BY: RLH 12/19/12
CHECKED BY: RJB 12/19/12
APPROVED BY: HMS 12/20/12

NATURAL
RESOURCE
TECHNOLOGY

REVISION:		DATE:	APP'D BY:
6.			
5.			
4.			
3.	ISSUED FOR RECORD DOCUMENTATION	07/03/14	EJT
2.	ISSUED FOR CONSTRUCTION	06/28/13	HMS
1.	ISSUED FOR BID	04/19/13	HMS
0.	ISSUED FOR PERMIT	12/20/12	HMS

Jul 17, 2014 1:19pm PLOTTED BY: dduda SAVED BY: dduda
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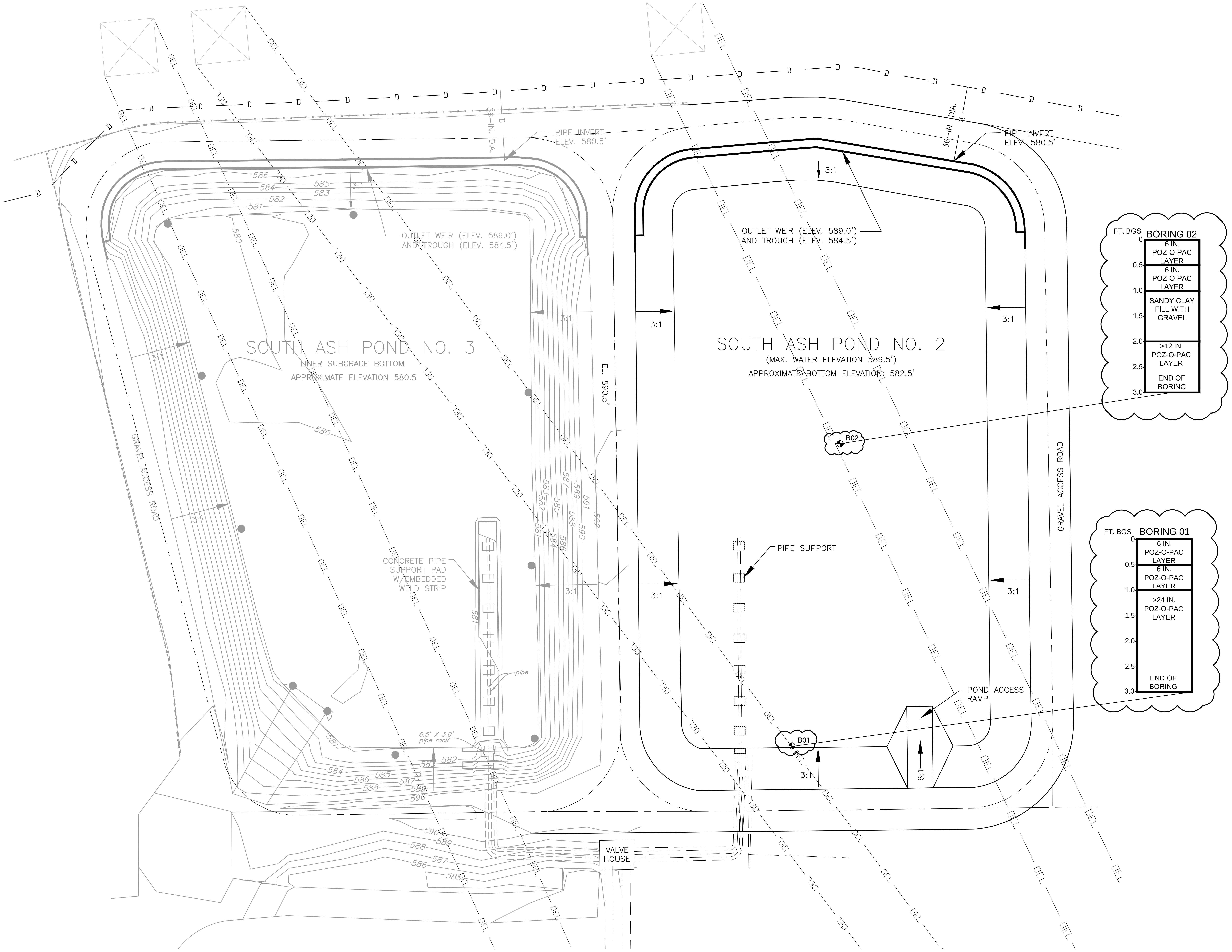


— — —	ABOVEGROUND INLET PIPE
— D —	UNDERGROUND DISCHARGE PIPING
— DEL —	OVERHEAD ELECTRIC LINE
B01 ⊕	BORING LOCATION
●	MARKER POST LOCATION

CONTRACTOR NOTES: △ COMPLETED DURING CONSTRUCTION
1. CONTRACTOR SHALL NOT DISTURB OPERATIONS OF ASH POND 3 WHEN WORKING ON ASH POND 2.

N

0 15 30 60

SCALE IN FEET

(APPROXIMATE)

SOURCE NOTES:
1. THIS DRAWING WAS DEVELOPED FROM DRAWING NO. 869D1–C11 REV. 7, BY HARZA ENGINEERING COMPANY, CHICAGO, ILLINOIS, DATED AUG. 1979, PROVIDED BY MIDWEST GENERATION.
2. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE. PIPING AND OTHER UTILITY LOCATIONS ARE APPROXIMATE.
3. <u>BORINGS WERE DRILLED BY BRIESER CONSTRUCTION COMPANY, INC. ON 07/17/13.</u>

6.			
5.			
4.			
3.	ISSUED FOR RECORD DOCUMENTATION	07/17/14	EJT
2.	ISSUED FOR CONSTRUCTION	06/28/13	HMS
1.	ISSUED FOR BID	04/19/13	HMS
0.	ISSUED FOR PERMIT	12/20/12	HMS
REVISION:		DATE:	APP'D BY:

NATURAL
RESOURCE
TECHNOLOGY

PROJECT NO.
2113.1

DRAWN BY:
RLH 12/19/12

CHECKED BY:
RJB 12/19/12

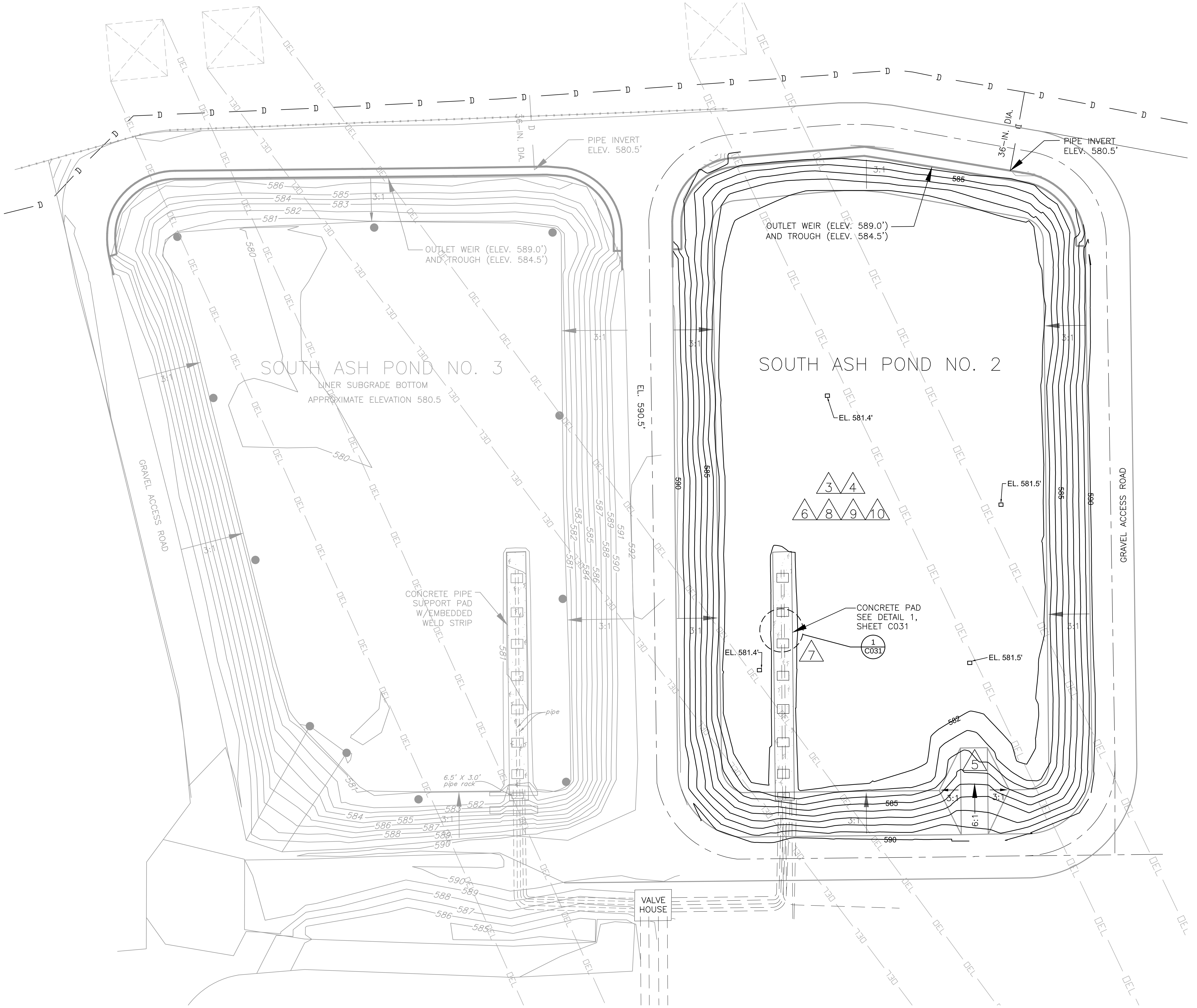
APPROVED BY:
HMS 12/20/12

PRE-CONSTRUCTION SITE CONDITIONS

SOUTH ASH POND 2 LINER REPLACEMENT
WILL COUNTY GENERATING STATION
MIDWEST GENERATION
ROMEOVILLE, WILL COUNTY, ILLINOIS

DRAWING NO: D21131C010-03
REFERENCE: .

SHEET NO.
C010



〰	MAJOR CONTOUR LINE
〰	MINOR CONTOUR LINE
583	EXISTING CONTOUR
— — —	ABOVEGROUND INLET PIPE
······	EXISTING FENCE
— D —	UNDERGROUND DISCHARGE PIPING
— DEL —	OVERHEAD ELECTRIC LINE
●	MARKER POST LOCATION
▨	CONCRETE

CONTRACTOR NOTES: △ COMPLETED DURING CONSTRUCTION

1. CONTRACTOR SHALL STORE ~~ALL GEOSYNTHETICS AND~~ SUBGRADE MATERIALS IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS.
2. CONTRACTOR SHALL STORE AND STAGE EQUIPMENT AT LOCATION APPROVED BY MIDWEST GENERATION.
3. PROTECT ALL CONCRETE AND UTILITY STRUCTURES THROUGHOUT PROJECT DURATION.
4. CONTRACTOR SHALL REMOVE ALL VEGETATION, ROCKS, AND OTHER DEBRIS GREATER THAN 1 INCH IN SIZE FROM POND SUBGRADE AND DISPOSE OF IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS.
5. CONTRACTOR SHALL CLEAN OFF THE RAMP CONCRETE SURFACE TO THE EXTENT PRACTICAL TO REMOVE ROCKS THAT MAY POSE A HAZARD TO GEOMEMBRANE, AS APPROVED BY GEOMEMBRANE INSTALLER, ENGINEER AND/OR MWG.
6. ~~CONTRACTOR SHALL REMOVE ENTIRE LAYER OF EXISTING POZ-O-PAC LINER FROM THE BASE OF THE ASH POND AND 6 INCHES OF EXISTING FILL MATERIAL BELOW THE POZ-O-PAC, EXCLUDING AREA AROUND PIPE SUPPORTS, AS NEEDED TO ACHIEVE FINAL SUBGRADE ELEVATION 581 FT. LOWER LAYER OF POZ-O-PAC SHALL REMAIN IN PLACE.~~ CONTRACTOR SHALL REMOVE POZ-O-PAC LAYERS AND EXISTING FILL MATERIAL, AS NEEDED, TO ACHIEVE APPROXIMATE FINAL SUBGRADE ELEVATION 581.5 FT., EXCLUDING AREA AROUND PIPE SUPPORTS.
7. CONTRACTOR SHALL CONSTRUCT CONCRETE PAD IN ACCORDANCE WITH THE CONTRACT DOCUMENTS (SEE DETAIL 1 ON SHEET C031).
8. CONTRACTOR SHALL PLACE 16 OZ/SY NONWOVEN GEOTEXTILE OVER THE PREPARED SUBGRADE IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS.
9. SUBGRADE SHALL BE APPROVED BY MWG AND/OR ENGINEER PRIOR TO INSTALLATION OF GEOMEMBRANE.
10. CONTRACTOR SHALL PROVIDE MEANS TO PROTECT SUBGRADE FROM EROSION, STORM WATER, AND HEAVY EQUIPMENT TRAFFIC. DAMAGE TO SUBGRADE SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE.

N

0 15 30 60

SCALE IN FEET

(APPROXIMATE)

SOURCE NOTES:

1. THIS DRAWING WAS DEVELOPED FROM DRAWING NO. 869D1-C11 REV. 7, BY HARZA ENGINEERING COMPANY, CHICAGO, ILLINOIS, DATED AUG. 1979, PROVIDED BY MIDWEST GENERATION.
2. ALSO FROM DRAWING NO. 309-1053-T BY RUETTIGER, TONELLI & ASSOCIATES, INC., JOLIET, ILLINOIS, DATED OCTOBER 5, 2009.
3. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE. PIPING AND OTHER UTILITY LOCATIONS ARE APPROXIMATE.
4. SUBGRADE CONTOURS AND POINT ELEVATIONS FROM SURVEY FILE "7017 AB LINER.DWG" DATED AUGUST 12, 2013, BY DLZ INDUSTRIAL SURVEYING, INC., JOLIET, ILLINOIS.

REVISION:		DATE:	APP'D BY:
6.			
5.			
4.			
3.	ISSUED FOR RECORD DOCUMENTATION	07/17/14	EJT
2.	ISSUED FOR CONSTRUCTION	06/28/13	HMS
1.	ISSUED FOR BID	04/19/13	HMS
0.	ISSUED FOR PERMIT	12/20/12	HMS

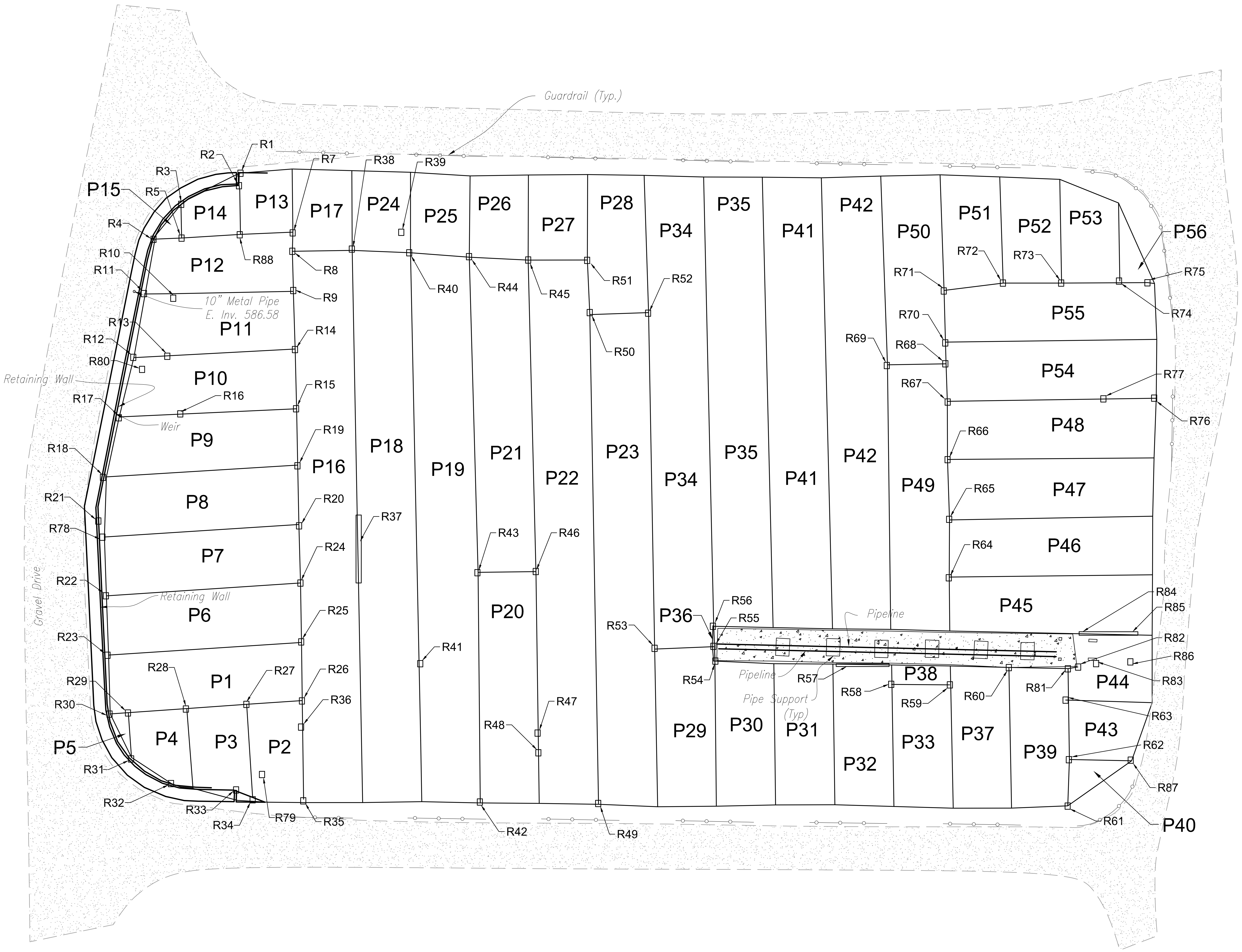
NATURAL
RESOURCE
TECHNOLOGY

PROJECT NO. 2113.1
DRAWN BY: RLH 12/19/12
CHECKED BY: RJB 12/19/12
APPROVED BY: HMS 12/20/12

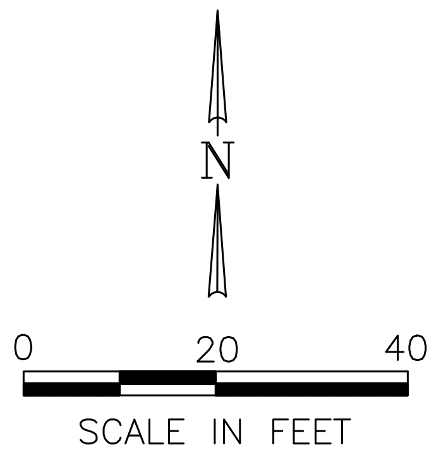
LINER SUBGRADE PREPARATION

SOUTH ASH POND 2 LINER REPLACEMENT
WILL COUNTY GENERATING STATION
MIDWEST GENERATION
ROMEOVILLE, WILL COUNTY, ILLINOIS

DRAWING NO: D21131C020-03
REFERENCE: .
SHEET NO. C020



P23	GEOMEMBRANE PANEL AND PANEL NUMBER
───	GEOMEMBRANE PANEL SEAM
☐ R3	GEOMEMBRANE REPAIR LOCATION (NOT TO SCALE)
▨	CONCRETE
–o–o–	GUARD RAIL
▨	GRAVEL DRIVE



SOURCE:
1. THIS FIGURE WAS DEVELOPED FROM SURVEY FILE 7017 AB LINER.dwg, DATED AUGUST 12, 2013, BY DLZ INDUSTRIAL SURVEYING, INC., JOLIET, ILLINOIS.

6.			
5.			
4.			
3.			
2.			
1.			
0.	ISSUED FOR RECORD DOCUMENTATION	07/17/14	EJT
REVISION:		DATE:	APP'D BY:

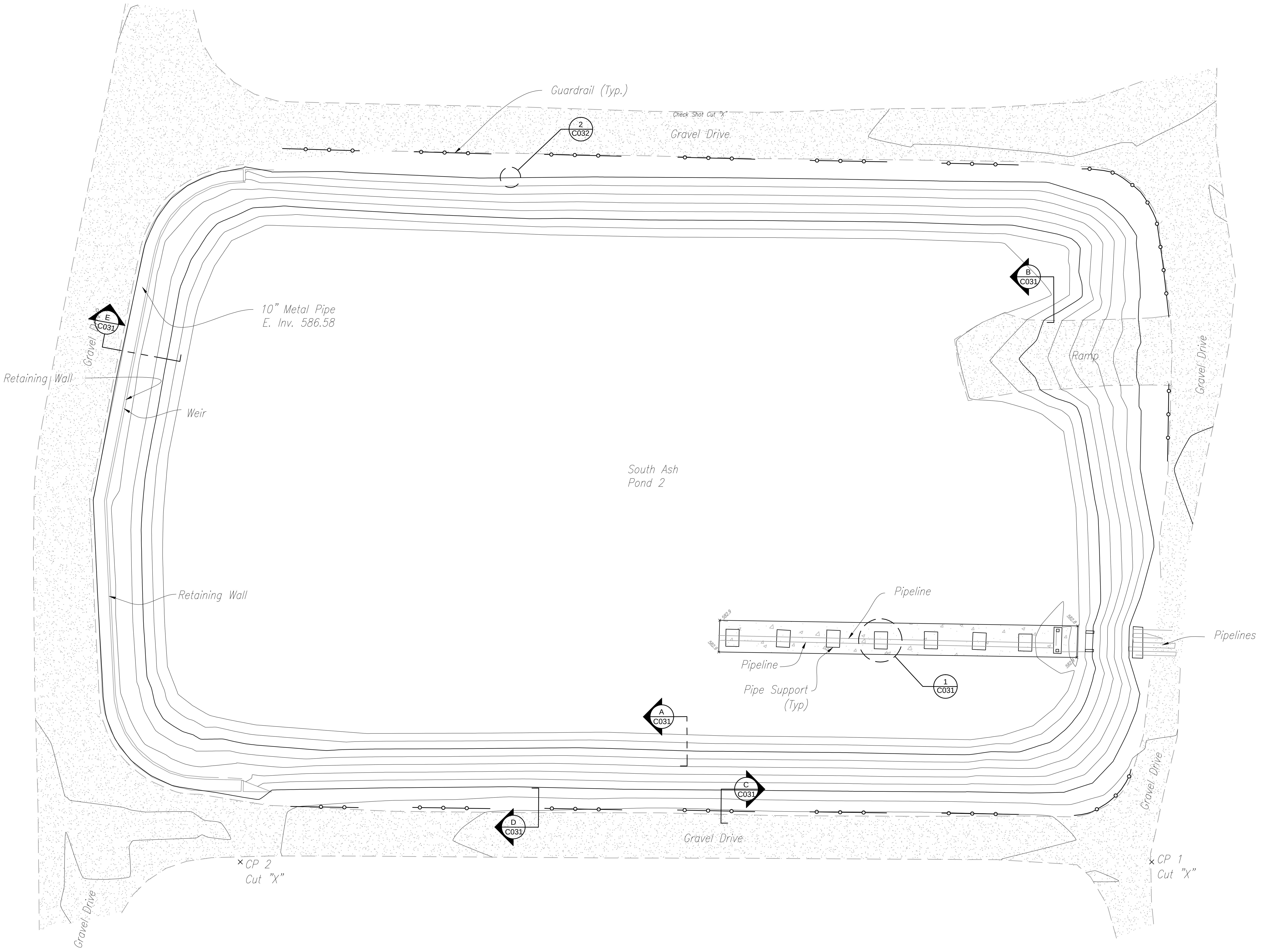
NATURAL RESOURCE TECHNOLOGY

PROJECT NO. 2113.1
DRAWN BY: RLH 11/22/13
CHECKED BY: JRR 01/28/14
APPROVED BY: EJT 07/17/14

GEOMEMBRANE PANEL LAYOUT

SOUTH ASH POND 2 LINER REPLACEMENT
WILL COUNTY GENERATING STATION
MIDWEST GENERATION
ROMEOVILLE, WILL COUNTY, ILLINOIS

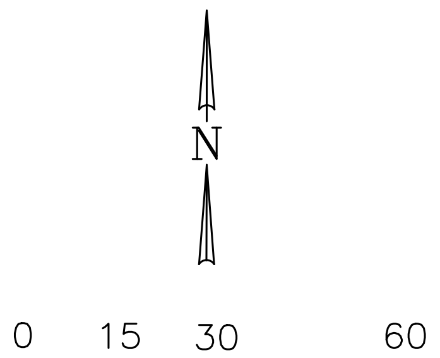
DRAWING NO: D21131C021-00
REFERENCE: .
SHEET NO. C021



— —	ABOVEGROUND INLET PIPE
——	UNDERGROUND DISCHARGE PIPE
— OEL —	OVERHEAD ELECTRIC LINE
——	ANCHOR TRENCH
—o—o—	GUARD RAIL
●	MARKER POST LOCATION
▨	CONCRETE
▥	~~WARNING LAYER~~
▩	~~GEOCELL~~
▨	GRAVEL DRIVE

CONTRACTOR NOTES: △ COMPLETED DURING CONSTRUCTION

1. CONTRACTOR SHALL INSTALL 60 MIL HDPE, WHITE, TEXTURED GEOMEMBRANE IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS PRIOR TO PLACEMENT OF THE CUSHION AND WARNING LAYERS. CONTRACTOR SHALL PROVIDE AND FOLLOW AN APPROVED GEOMEMBRANE LAYOUT PLAN.
2. GEOMEMBRANE SHALL BE ANCHORED INTO 2.5 FEET DEEP TRENCHES ALONG TOP OF POND BANK, AS SHOWN ON SHEET C031. CONTRACTOR SHALL ADVISE MWG AND/OR ENGINEER IF PROPOSED LOCATION FOR ANCHOR TRENCH IS NOT POSSIBLE.
3. CONTRACTOR SHALL PLACE 16 OZ/SY NONWOVEN GEOTEXTILE OVER THE GEOMEMBRANE FOLLOWING ENGINEER APPROVAL AND PASSING QUALITY CONTROL RESULTS IN ACCORDANCE WITH TECHNICAL SPECIFICATIONS (SEE SHEET C031).
4. GEOCELL SHALL BE INSTALLED ALONG SIDE SLOPES IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS AND MANUFACTURER'S RECOMMENDATIONS (SEE SHEET C032). NO VEHICULAR TRAFFIC IS ALLOWED ON THE GEOCELL PRIOR TO INFILL.
5. CUSHION MATERIAL AND WARNING LAYER MATERIAL SHALL BE PLACED AT THE BASE OF POND IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS (SEE SHEET C031).
6. RESTORE AREAS DISTURBED BY EQUIPMENT AND MATERIAL LAYDOWN.
7. CONTRACTOR SHALL PROVIDE SURVEY DOCUMENTATION OF THE ITEMS LISTED IN THE TECHNICAL SPECIFICATIONS.
8. CONTRACTOR SHALL PERFORM A LEAK LOCATION SURVEY IN ACCORDANCE WITH TECHNICAL SPECIFICATIONS FOLLOWING PLACEMENT OF GEOCELL, CUSHION, AND WARNING LAYERS.
9. CONTRACTOR SHALL INSTALL GUARDRAILS ALONG TOP OF SLOPE EVERY 20 FEET AS SHOWN (SEE DETAIL ON SHEET C031) AND IN ACCORDANCE WITH MANUFACTURER'S REQUIREMENTS/INSTRUCTIONS AS APPROVED BY MWG AND/OR ENGINEER.



SCALE IN FEET
(APPROXIMATE)

SOURCE NOTES:

1. THIS DRAWING WAS DEVELOPED FROM DRAWING NO. 7017AB2, BY DLZ INDUSTRIAL, LLC BURNS HARBOR, INDIANA, DATED AUGUST 12 2013, PROVIDED BY BREISER CONSTRUCTION CO. FINAL ELEVATIONS SURVEYED SEPTEMBER 6, 2013.

6.			
5.			
4.			
3.	ISSUED FOR RECORD DOCUMENTATION	07/17/14	EJT
2.	ISSUED FOR CONSTRUCTION	06/28/13	HMS
1.	ISSUED FOR BID	05/03/13	HMS
0.	ISSUED FOR PERMIT	12/20/12	HMS
REVISION:		DATE:	APP'D BY:

NATURAL
RESOURCE
TECHNOLOGY

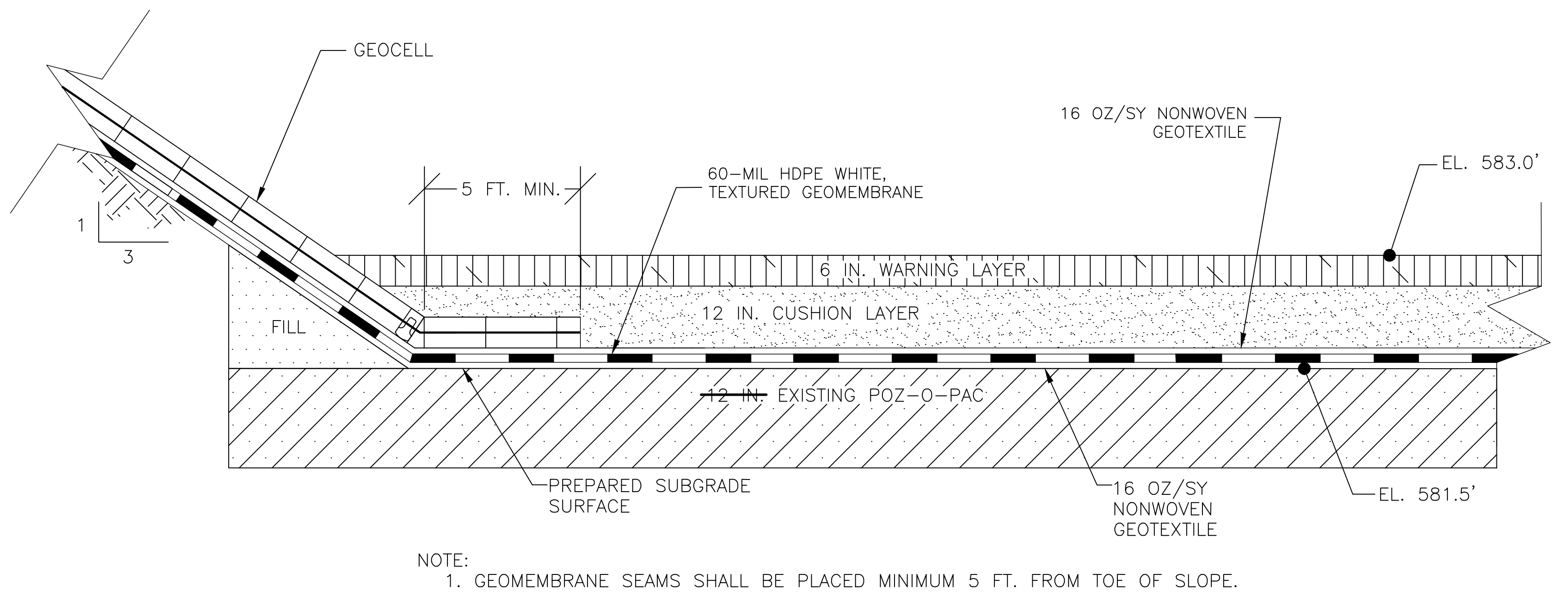
PROJECT NO.
2113.1
DRAWN BY:
RLH 12/19/12
CHECKED BY:
RJB 12/19/12
APPROVED BY:
HMS 12/20/12

GEOCELL AND WARNING LAYER PLAN

SOUTH ASH POND 2 LINER REPLACEMENT
WILL COUNTY GENERATING STATION
MIDWEST GENERATION
ROMEOVILLE, WILL COUNTY, ILLINOIS

DRAWING NO: D21131C030-02
REFERENCE: .

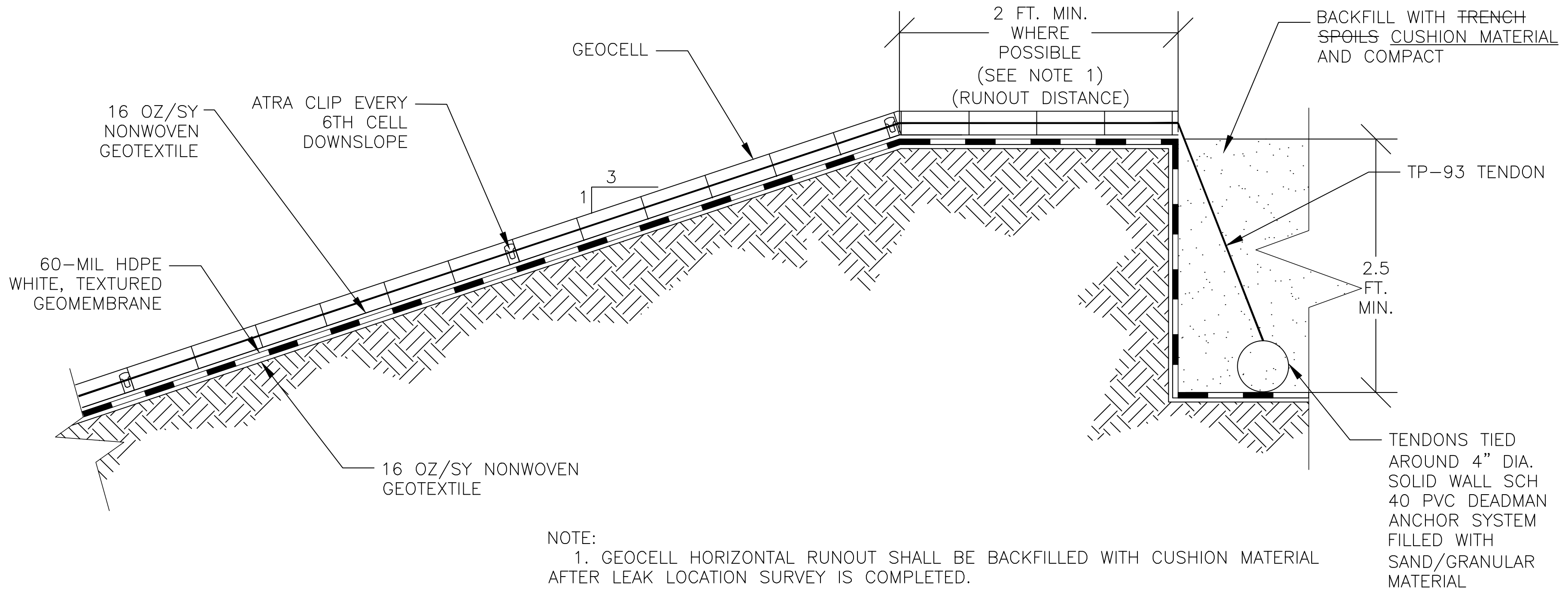
SHEET NO.
C030



NOTE:
1. GEOMEMBRANE SEAMS SHALL BE PLACED MINIMUM 5 FT. FROM TOE OF SLOPE.

A / C030 SLOPE TRANSITION SECTION

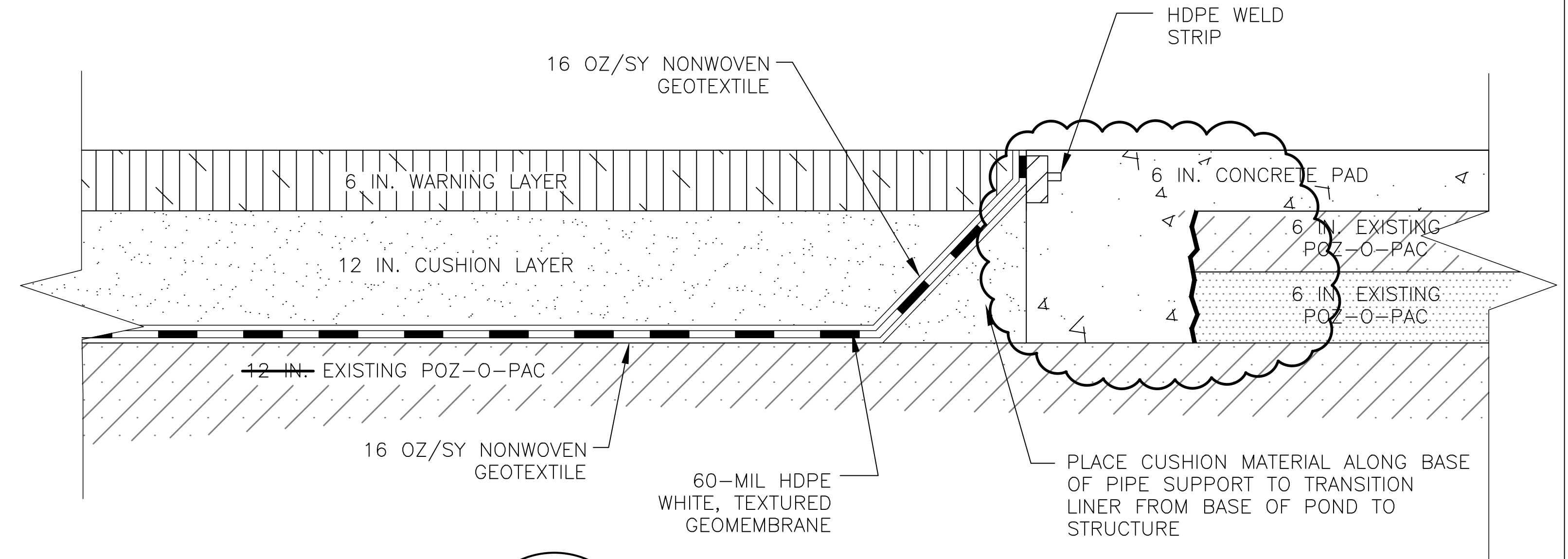
NOT TO SCALE



NOTE:
1. GEOCELL HORIZONTAL RUNOUT SHALL BE BACKFILLED WITH CUSHION MATERIAL AFTER LEAK LOCATION SURVEY IS COMPLETED.

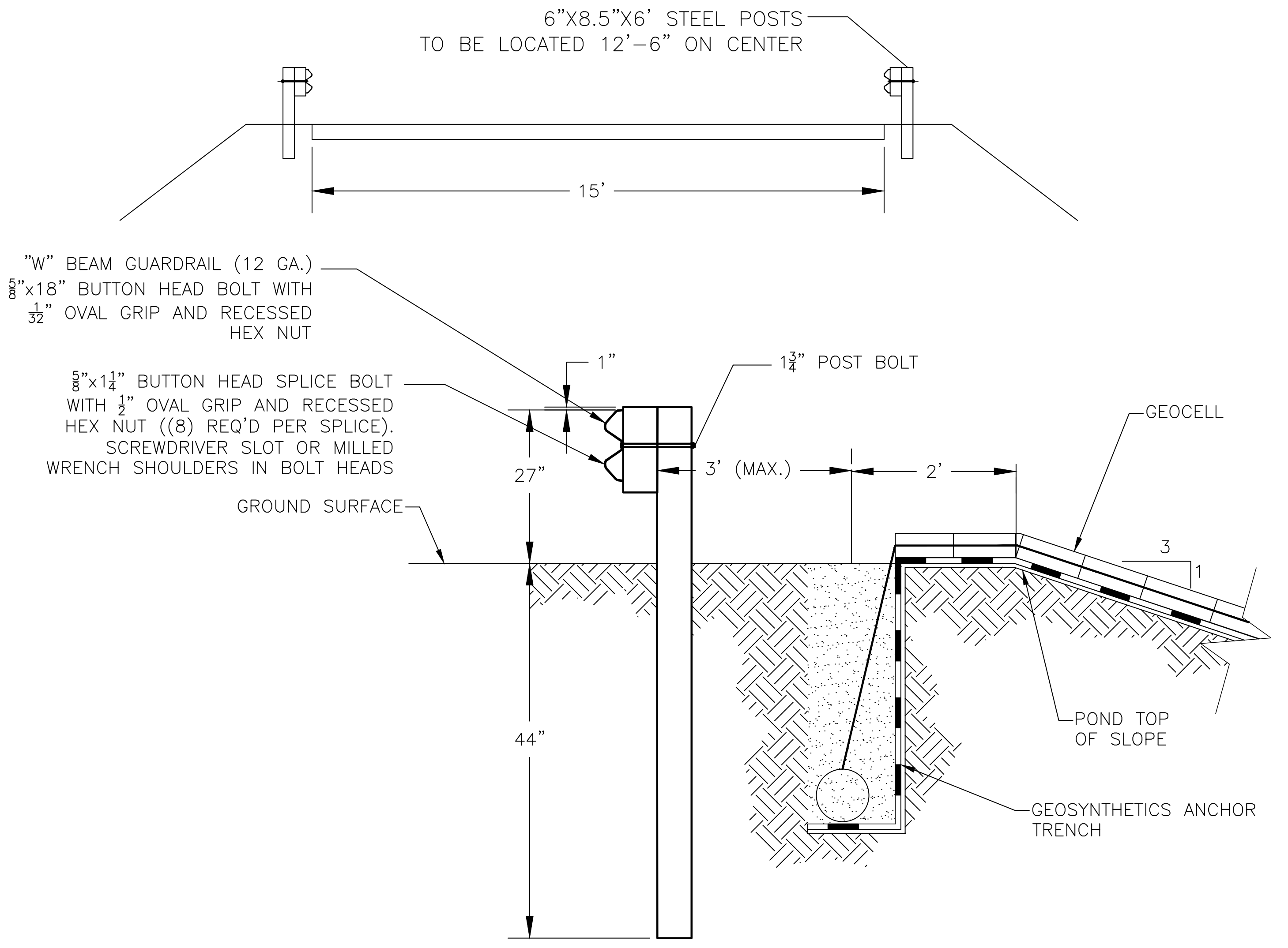
C / C030 ANCHOR TRENCH SECTION

NOT TO SCALE



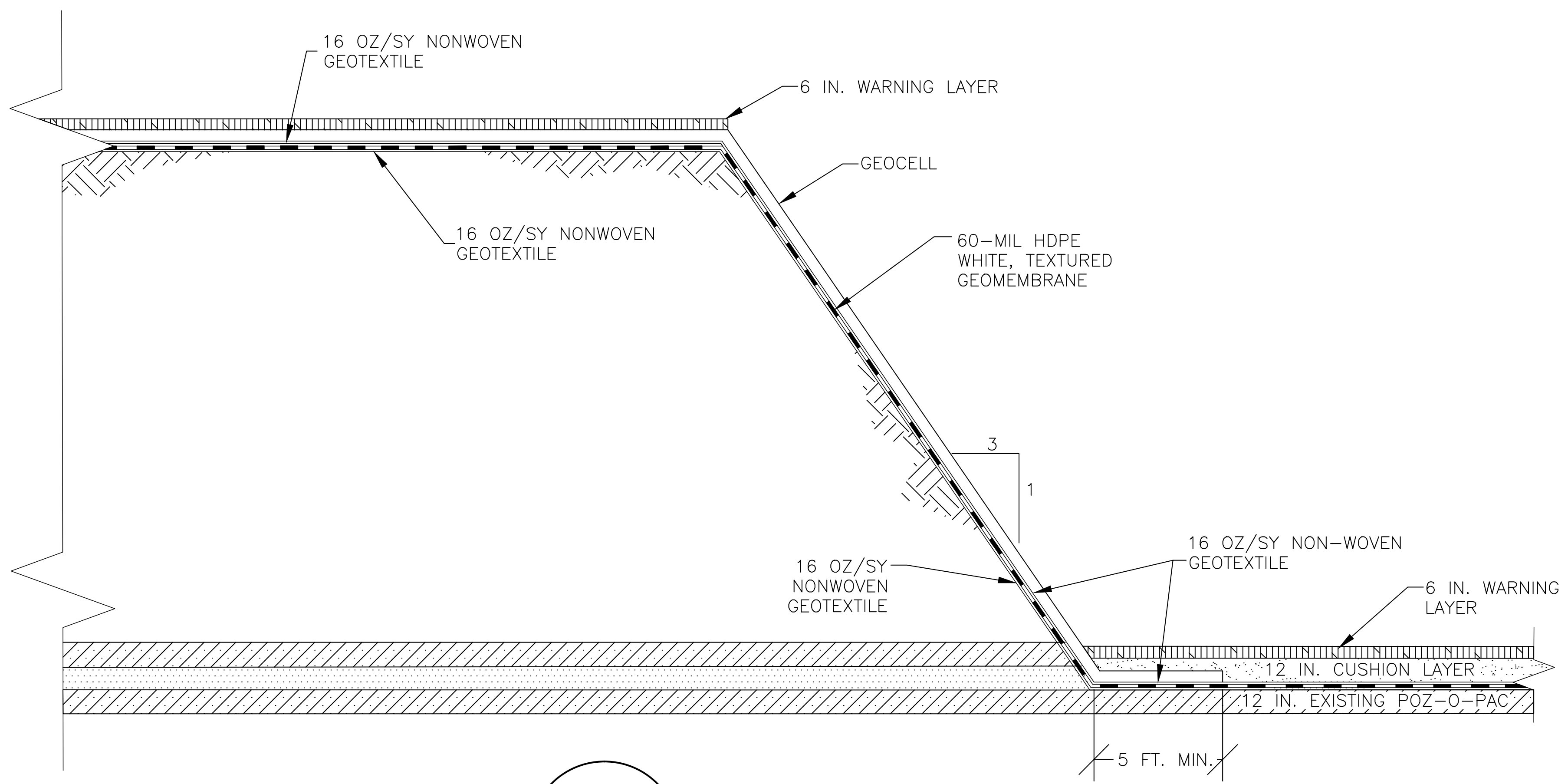
1 / C020 C030 CONCRETE PAD DETAIL

NOT TO SCALE



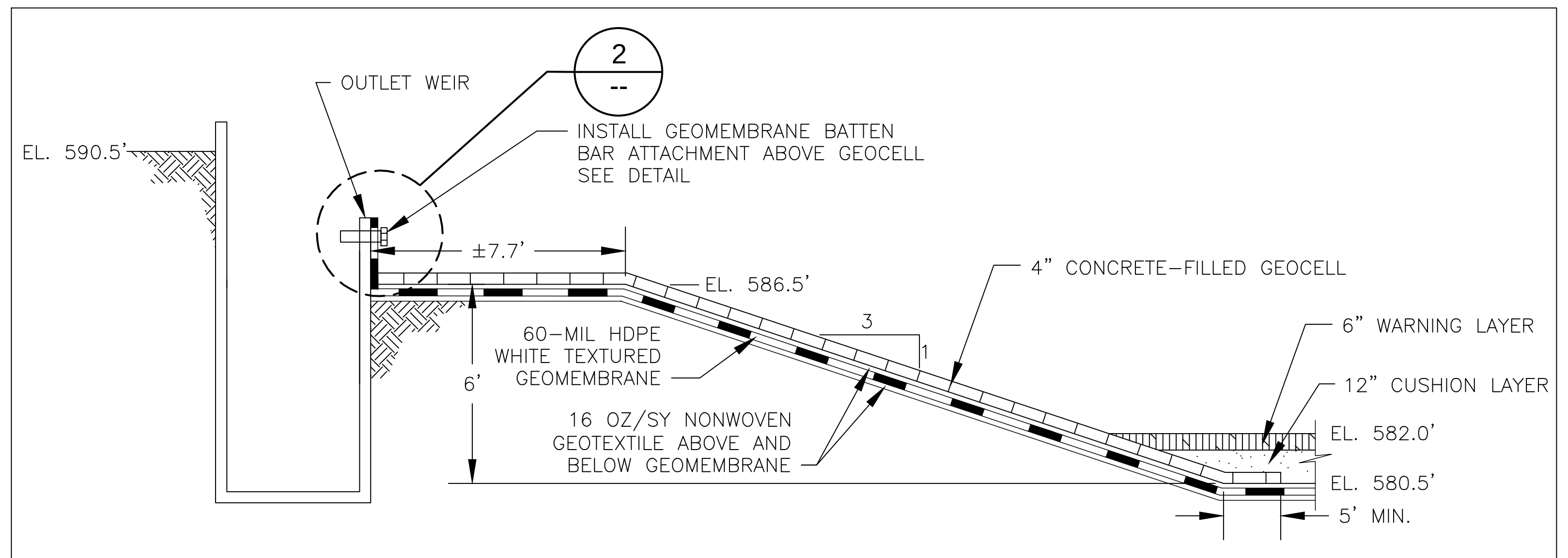
D / C030 GUARDRAIL SECTION

NOT TO SCALE



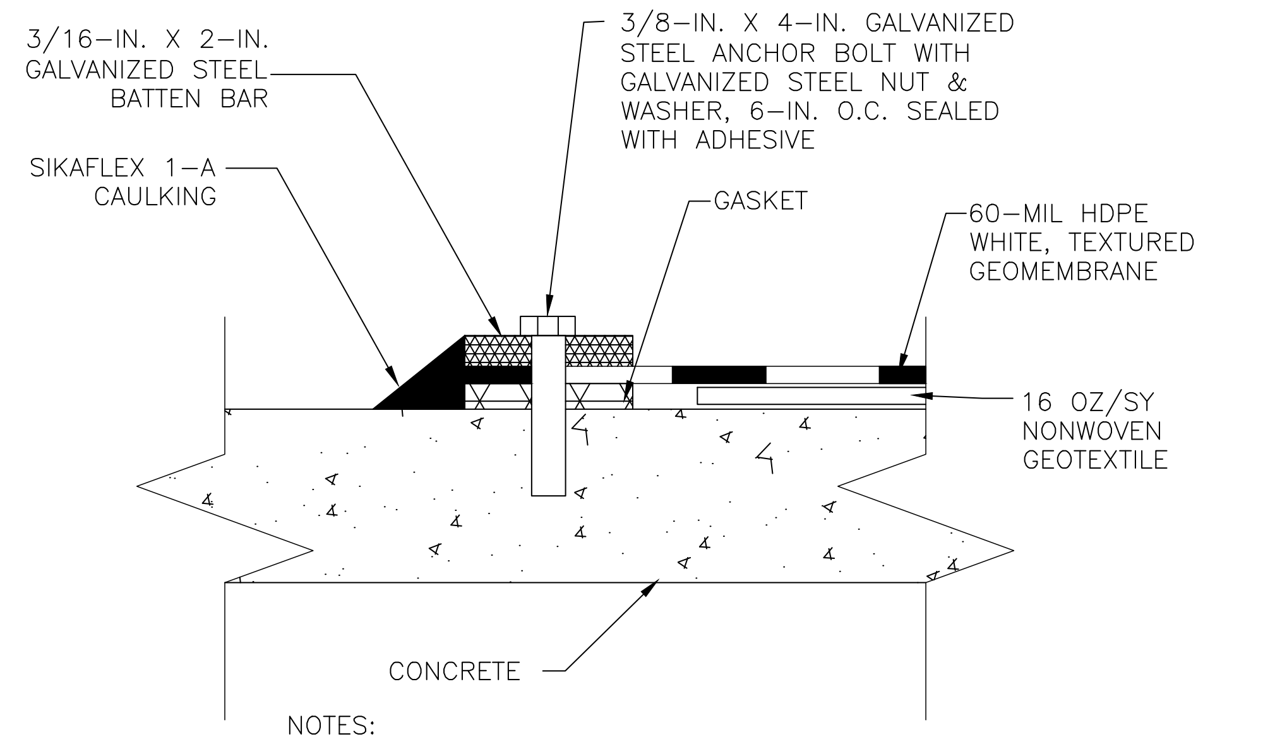
B / C030 RAMP SECTION

NOT TO SCALE



E / C030 WEIR AND GEOCELL SECTION

NOT TO SCALE



NOTES:
1. ANCHOR BOLTS 6 IN. ON CENTER.

2 / -- BATTEN BAR ATTACHMENT

NOT TO SCALE

REVISION:		DATE:	APP'D BY:
6.			
5.			
4.			
3.	ISSUED FOR RECORD DOCUMENTATION	07/17/14	EJT
2.	ISSUED FOR CONSTRUCTION	07/01/13	HMS
1.	ISSUED FOR BID	05/03/13	HMS
0.	ISSUED FOR PERMIT	12/20/12	HMS

NATURAL RESOURCE TECHNOLOGY

PROJECT NO. 2113.1
DRAWN BY: RLH 12/19/12
CHECKED BY: RJB 12/19/12
APPROVED BY: HMS 12/20/12

DETAILS AND SECTIONS

SOUTH ASH POND 2 LINER REPLACEMENT
WILL COUNTY GENERATING STATION
MIDWEST GENERATION
ROMEOVILLE, WILL COUNTY, ILLINOIS

DRAWING NO: D21131C031-03
REFERENCE: .
SHEET NO. C031

Jul 17, 2014 1:27pm PLOTTED BY: ddudo SAVED BY: ddudo
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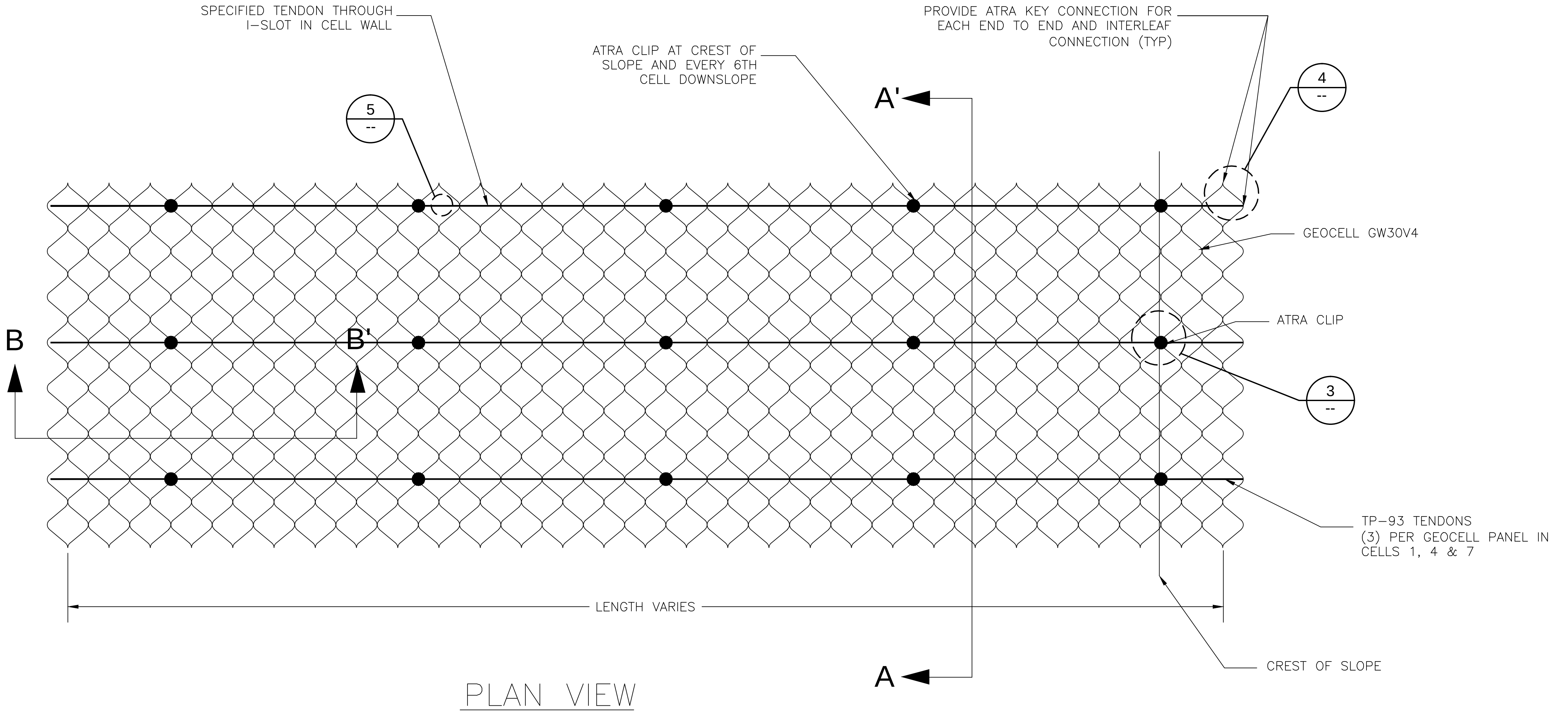
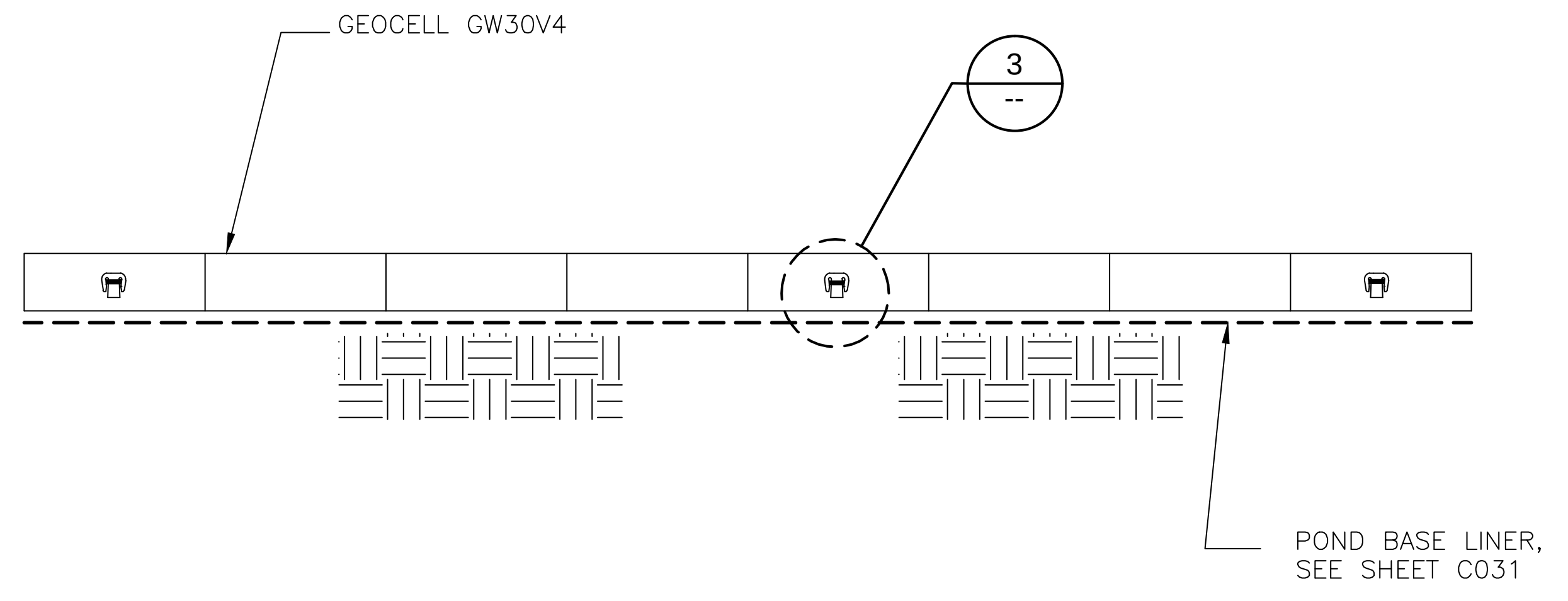


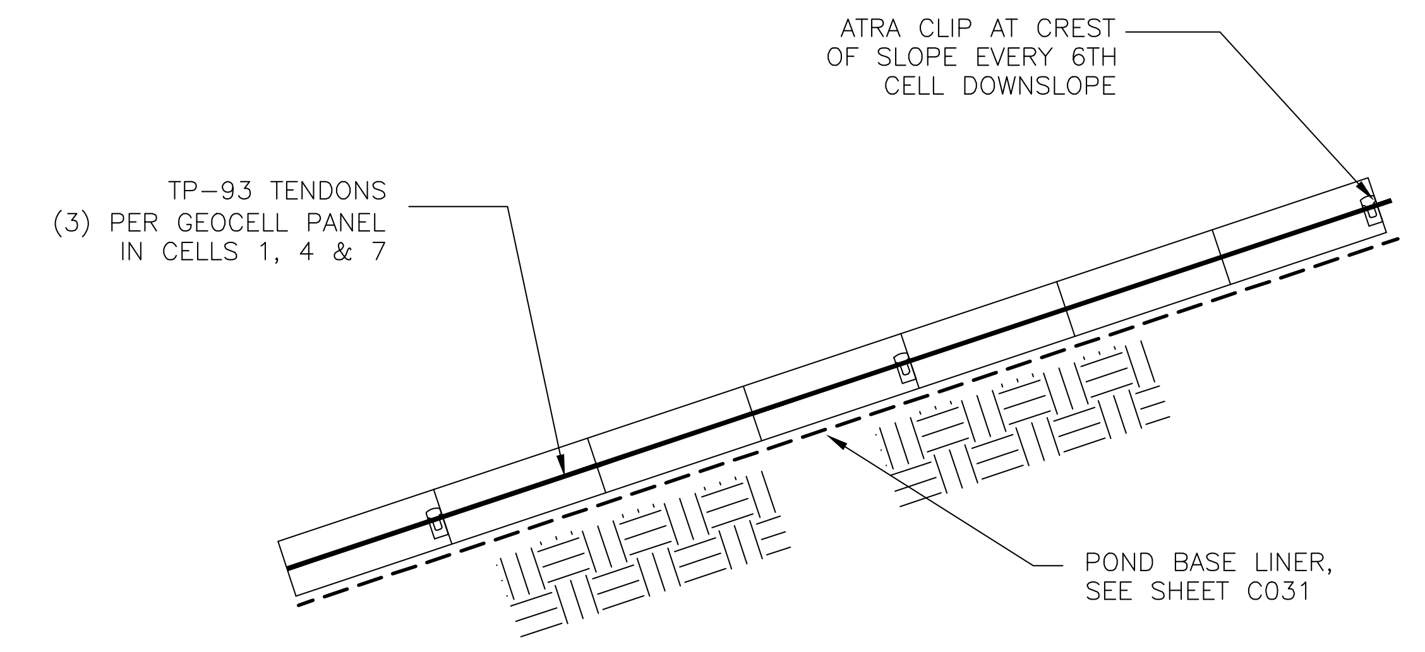
PLAN VIEW

2 C030 GEOCELL PANEL AND CONNECTIONS DETAIL

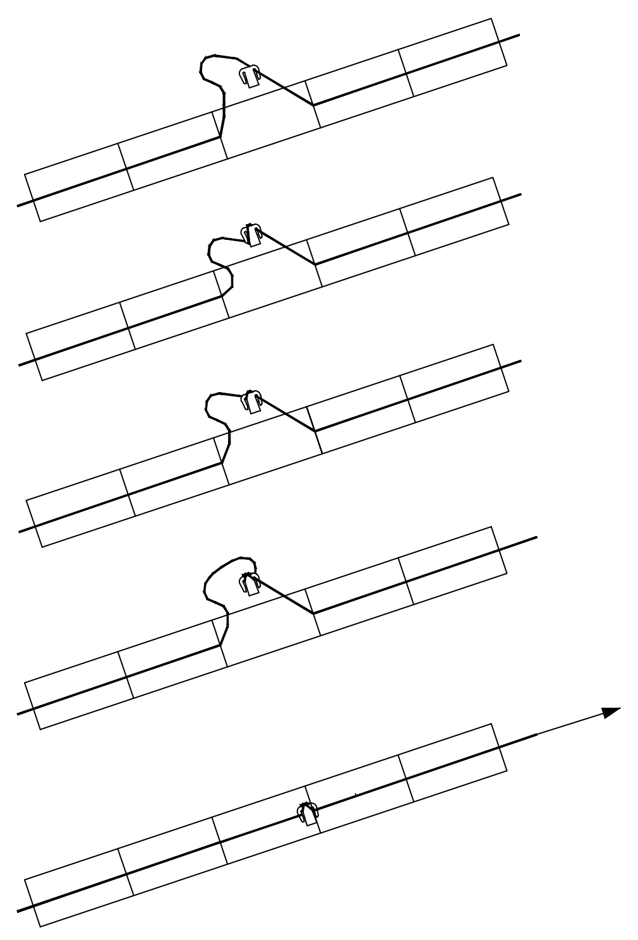
NOT TO SCALE



SECTION A–A'



SECTION B–B'



STEPS:

1. PLACE THE TENDON UNDER THE ARM OF THE ATRA CLIP.
2. DIAGONALLY CROSS THE TENDON OVER THE TOP OF THE ATRA CLIP.
3. PLACE THE TENDON UNDER THE OTHER ARM AND PULL TIGHT TO REMOVE SLACK.
4. DIAGONALLY CROSS THE TENDON BACK OVER THE TOP OF THE ATRA CLIP AND PLACE TENDON UNDER THE FIRST ARM.
5. PULL THE TENDON TIGHT TO REMOVE SLACK.
6. ATRA CLIP SHALL BE TIGHT AGAINST THE UPPER CELL WALL AFTER SECURING.
7. PULL TENDON TIGHT AT LOCATION OF NEXT ATRA CLIP.

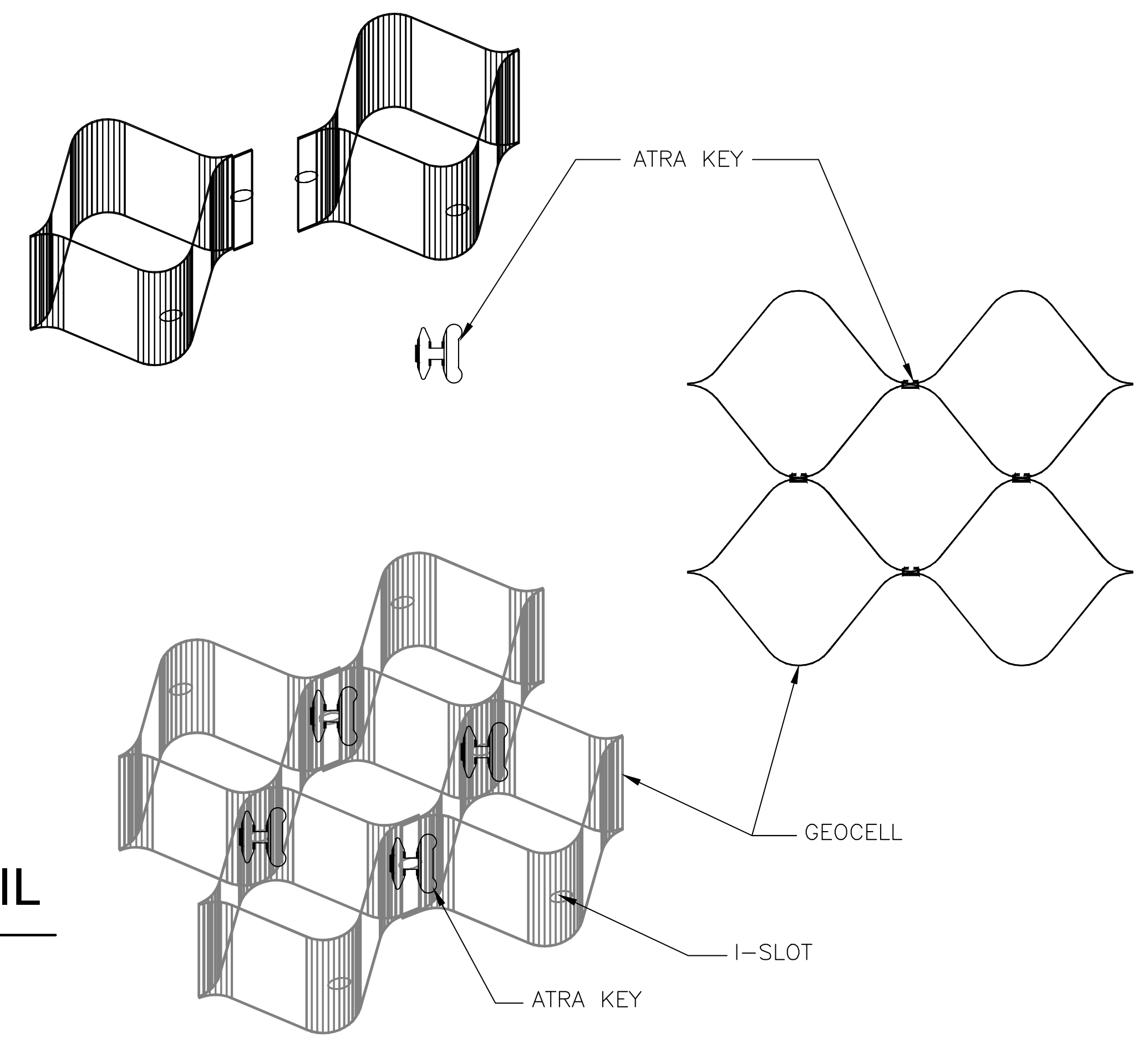
3 -- ATRA® CLIP INSTALLATION DETAIL

NOT TO SCALE

ATRA KEY® CONNECTION DETAILS

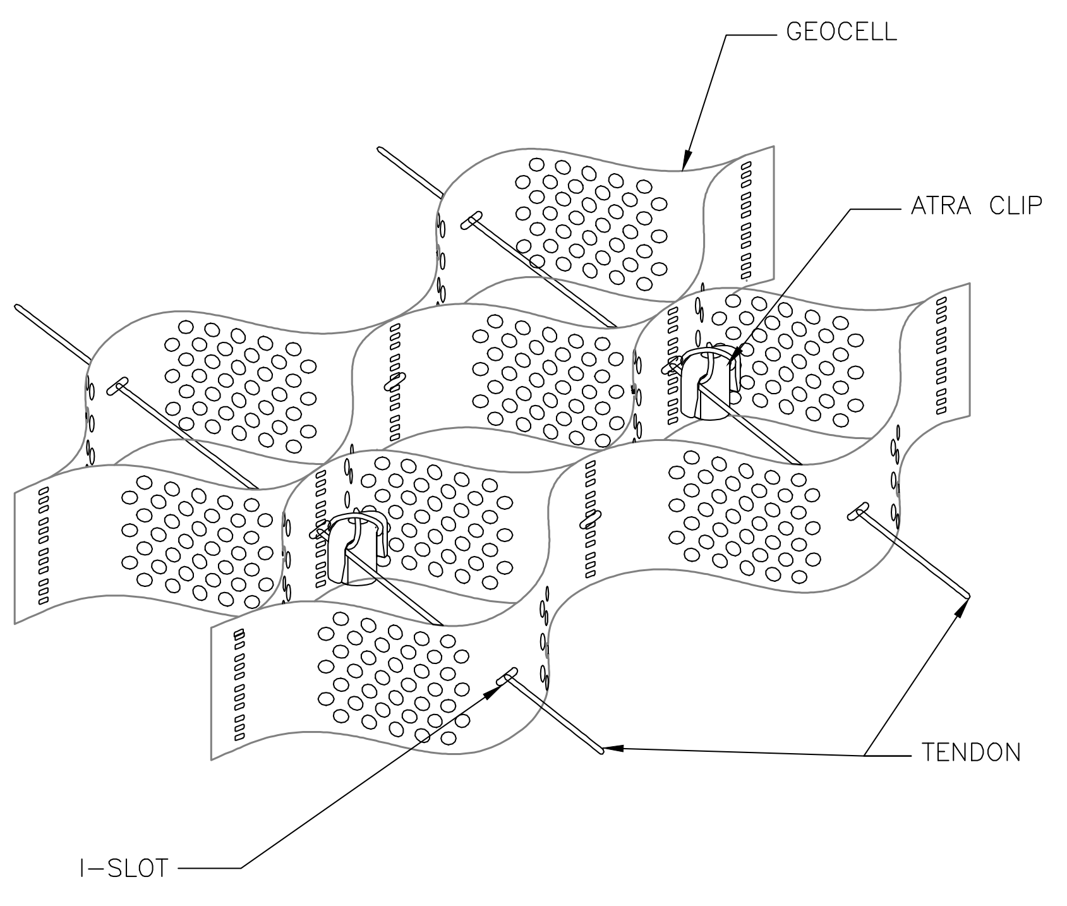
GEOCELL CONNECTION NOTES:

1. THE TOP EDGES OF ADJACENT CELL WALLS SHALL BE FLUSH WHEN CONNECTING.
2. ALIGN THE I-SLOTS FOR INTERLEAF AND END TO END CONNECTIONS.
3. THE GEOCELL PANELS SHALL BE CONNECTED WITH ATRA KEYS AT EACH INTERLEAF AND END TO END CONNECTION.



4 -- GEOCELL SIDE AND END CONNECTION DETAIL

NOT TO SCALE



5 -- TENDON DETAIL

NOT TO SCALE

6.			
5.			
4.			
3.	ISSUED FOR RECORD DOCUMENTATION	07/03/14	EJT
2.	ISSUED FOR CONSTRUCTION	06/28/13	HMS
1.	ISSUED FOR BID	04/19/13	HMS
0.	ISSUED FOR PERMIT	12/20/12	HMS
REVISION:		DATE:	APP'D BY:

NATURAL
RESOURCE
TECHNOLOGY

PROJECT NO.
2113.1
DRAWN BY:
RLH 12/13/12
CHECKED BY:
RJB 12/13/12
APPROVED BY:
HMS 12/20/12

GEOCELL DETAILS AND SECTIONS

SOUTH ASH POND 2 LINER REPLACEMENT
WILL COUNTY GENERATING STATION
MIDWEST GENERATION
ROMEOVILLE, WILL COUNTY, ILLINOIS

DRAWING NO: D21131C032-03
REFERENCE: .
SHEET NO.
C032

Jul 17, 2014 1:29pm PLOTTED BY: dduda SAVED BY: dduda
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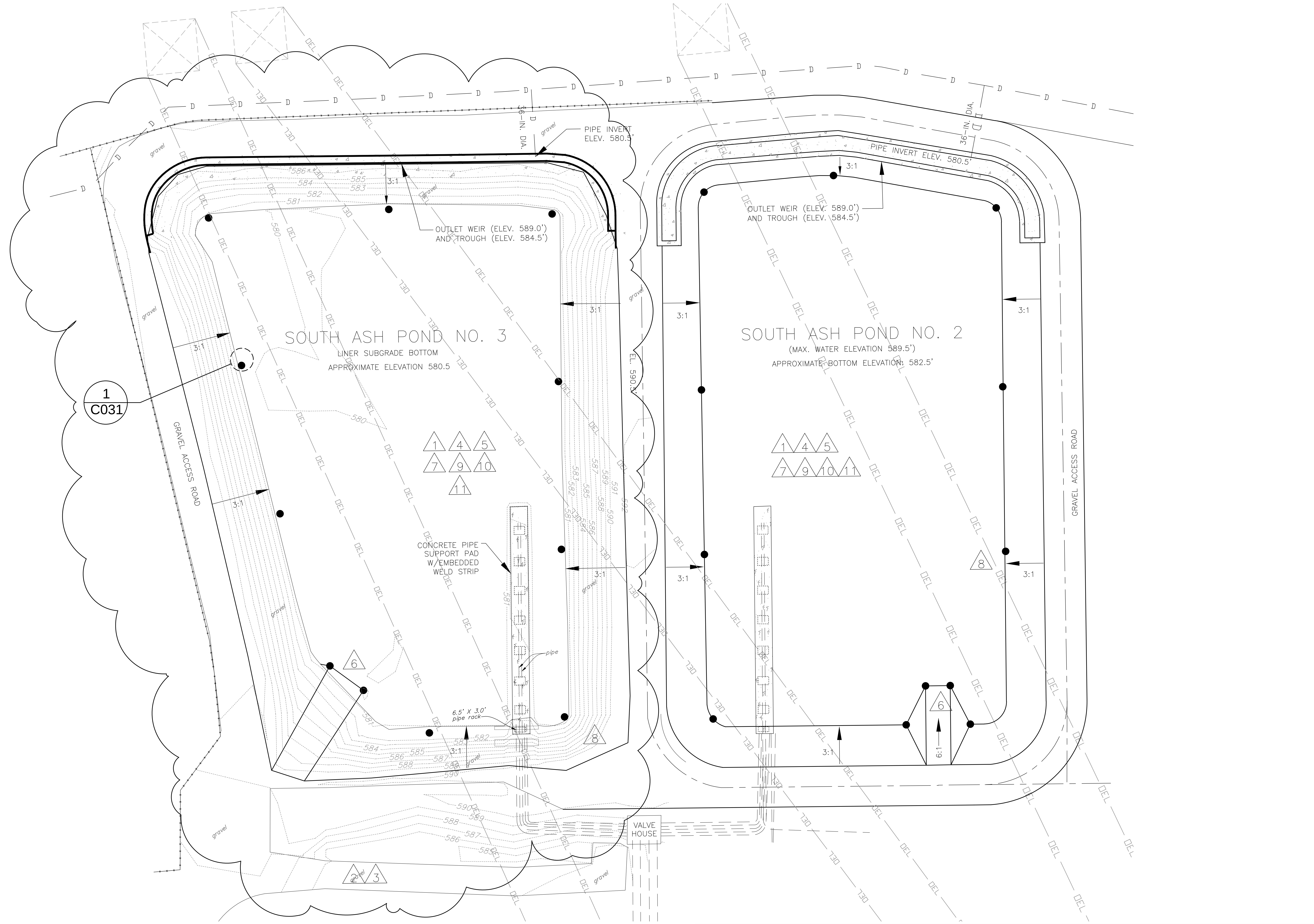
XREFS:

ATTACHMENT 2-3

2009 POND 3S LINER REPLACEMENT DRAWINGS

DRAWING NO.	TITLE
D1900C020-03	LINER SUBGRADE PREPARATION
D1900C030-04	WARNING LAYER PLAN
D1900C031-04	DETAILS AND SECTIONS



LEGEND

583	EXISTING CONTOUR
— — —	ABOVEGROUND INLET PIPE
—+—+—	EXISTING FENCE
— D —	UNDERGROUND DISCHARGE PIPING
— DEL —	OVERHEAD ELECTRIC LINE
●	MARKER POST LOCATION
▨	CONCRETE
MWG	MIDWEST GENERATION, LLC
☁	RECORD DOCUMENTATION

CONTRACTOR NOTES: △

1. CONTRACTOR SHALL BEGIN CONSTRUCTION SEQUENCE WITH SOUTH ASH POND NO. 3.
2. CONTRACTOR SHALL STORE ALL GEOSYNTHETICS AND SUBGRADE MATERIALS IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS.
3. CONTRACTOR SHALL STORE AND STAGE EQUIPMENT AT LOCATION APPROVED BY MIDWEST GENERATION.
4. PROTECT ALL CONCRETE AND UTILITY STRUCTURES THROUGHOUT PROJECT DURATION.
5. CONTRACTOR SHALL REMOVE ALL VEGETATION, ROCKS, AND OTHER DEBRIS GREATER THAN 3 INCHES IN SIZE FROM POND SUBGRADE AND DISPOSE OF IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS.
6. CONTRACTOR SHALL CLEAN OFF THE RAMP CONCRETE SURFACE TO THE EXTENT PRACTICAL TO REMOVE ROCKS THAT MAY POSE A HAZARD TO GEOMEMBRANE, AS APPROVED BY GEOMEMBRANE INSTALLER, ENGINEER AND/OR MWG.
7. CONTRACTOR SHALL REMOVE ENTIRE LAYER OF EXISTING POZ-O-PAC LINER FROM THE BASE OF THE ASH PONDS AND 6 INCHES OF EXISTING FILL MATERIAL BELOW THE LINER, EXCLUDING AREA AROUND PIPE SUPPORTS AS NEEDED TO ACHIEVE FINAL SUBGRADE ELEVATION 581 FT. LOWER LAYER OF POZ-O-PAC SHALL REMAIN IN PLACE.
8. CONTRACTOR SHALL INSTALL MARKER POSTS ALONG THE BASE OF THE ASH PONDS AS SHOWN AND IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS.
9. CONTRACTOR SHALL PLACE 16 OZ. NONWOVEN GEOTEXTILE OVER THE PREPARED SUBGRADE IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS.
10. SUBGRADE SHALL BE APPROVED BY MWG AND/OR ENGINEER PRIOR TO INSTALLATION OF GEOMEMBRANE.
11. CONTRACTOR SHALL PROVIDE MEANS TO PROTECT SUBGRADE FROM EROSION, STORM WATER, AND HEAVY EQUIPMENT TRAFFIC. DAMAGE TO SUBGRADE SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE.

N

0 15 30 60

SCALE IN FEET

(APPROXIMATE)

SOURCE:
THIS DRAWING WAS DEVELOPED FROM DRAWING NO. 869D1-C11 REV. 7, BY HARZA ENGINEERING COMPANY, CHICAGO, ILLINOIS, DATED AUG. 1979, PROVIDED BY MIDWEST GENERATION.
ALSO FROM DRAWING NO. 309-1053-T BY RUETTINGER, TONELLI AND ASSOCIATES, INC., JOLIET, ILLINOIS, DATED OCTOBER 5, 2009.
ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE. PIPING AND OTHER UTILITY LOCATIONS ARE APPROXIMATE.

6.			
5.			
4.			
3.	RECORD DOCUMENTATION FOR SOUTH ASH POND 3	12/30/09	HMS
2.	ISSUED FOR CONSTRUCTION	08/28/09	HMS
1.	ISSUED FOR BID	08/20/08	HMS
0.	ISSUED FOR PERMIT	07/15/08	HMS
REVISION:		DATE:	APP'D BY:

NATURAL
RESOURCE
TECHNOLOGY

PROJECT NO.
1900

DRAWN BY:
RLH/KNW 6/23/08

CHECKED BY:
EJT 6/23/08

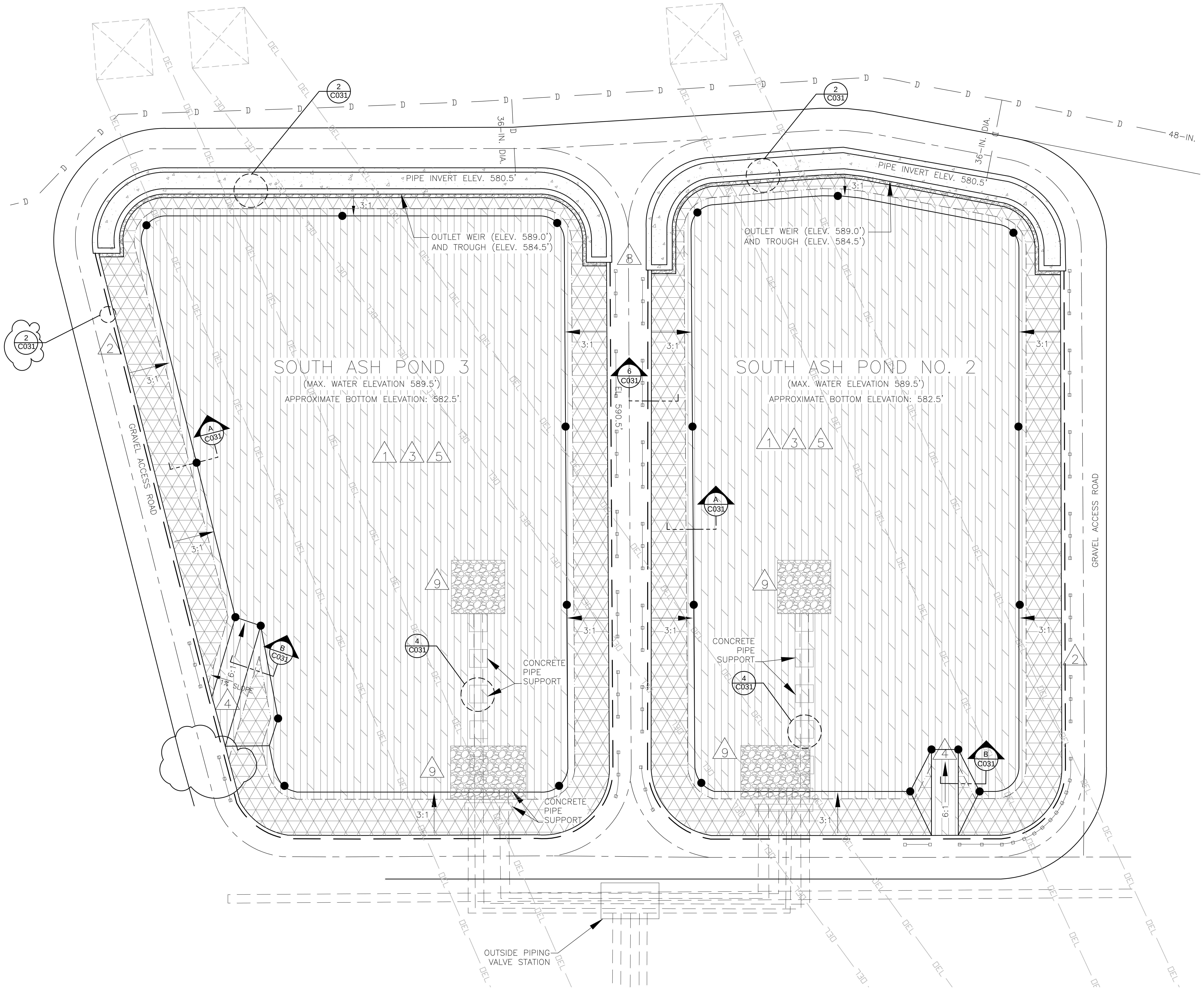
APPROVED BY:
HMS 7/15/08

LINER SUBGRADE PREPARATION

SOUTH ASH POND LINER REPLACEMENT
MIDWEST GENERATION
WILL COUNTY GENERATING STATION
ROMEOVILLE, ILLINOIS

DRAWING NO: D1900C020-03
REFERENCE: \bids-con

SHEET NO.
C020



CONTRACTOR NOTES: △

1. CONTRACTOR SHALL INSTALL 60 MIL HDPE, WHITE, TEXTURED GEOMEMBRANE IN ACCORDANCE WITH THE TECHNICAL SPECIFICATION PRIOR TO PLACEMENT OF THE WARNING LAYER. CONTRACTOR SHALL PROVIDE AND FOLLOW AN APPROVED GEOMEMBRANE LAYOUT PLAN.
2. GEOMEMBRANE SHALL BE ANCHORED INTO 2.5 FEET DEEP TRENCHES ALONG TOP OF POND BANK, AS SHOWN ON SHEET C031. CONTRACTOR SHALL ADVISE MWG AND/OR ENGINEER IF PROPOSED LOCATION FOR ANCHOR TRENCH IS NOT POSSIBLE.
3. CONTRACTOR SHALL PLACE 12-OZ. NON-WOVEN GEOTEXTILE, CUSHION MATERIAL AND WARNING LAYER MATERIAL OVER THE GEOMEMBRANE AT BASE AND 4 FEET ON SIDE SLOPES FOLLOWING ENGINEER APPROVAL AND PASSING QUALITY CONTROL RESULTS IN ACCORDANCE WITH TECHNICAL SPECIFICATIONS (SEE SHEET C031).
4. CONTRACTOR SHALL PLACE 2 LAYERS OF 12-OZ. NONWOVEN GEOTEXTILE, CUSHION AND WARNING LAYER MATERIALS OVER THE GEOMEMBRANE ON THE RAMP, AS SHOWN ON SHEET C031.
5. RESTORE AREAS DISTURBED BY EQUIPMENT AND MATERIAL LAYDOWN.
6. CONTRACTOR SHALL PROVIDE SURVEY DOCUMENTATION OF THE ITEMS LISTED IN THE TECHNICAL SPECIFICATIONS.
7. CONTRACTOR SHALL PERFORM A LEAK LOCATION SURVEY IN ACCORDANCE WITH TECHNICAL SPECIFICATIONS.
8. CONTRACTOR SHALL INSTALL GUARDRAILS ALONG TOP OF SLOPE EVERY 20 FEET AS SHOWN (SEE DETAIL ON SHEET C031) AND IN ACCORDANCE WITH MANUFACTURER'S REQUIREMENTS/INSTRUCTIONS AS APPROVED BY MWG AND/OR ENGINEER.
9. CONTRACTOR SHALL PLACE RIPRAP 18 INCHES THICK, AT PIPE OUTFALLS ABOVE CUSHION LAYER AND OVER 12-OZ. NON-WOVEN GEOTEXTILE.

LEGEND

— — —	ABOVEGROUND INLET PIPE
— D —	UNDERGROUND DISCHARGE PIPE
— DEL —	OVERHEAD ELECTRIC LINE
▬ ▬	ANCHOR TRENCH
— · —	12 OZ. NON-WOVEN GEOTEXTILE
—▫—▫—	GUARD RAIL
●	MARKER POST LOCATION
▭	CONCRETE
▥	WARNING LAYER
▩	HDPE GEOMEMBRANE
▨	RIPRAP

N

0 15 30 60
SCALE IN FEET
(APPROXIMATE)

SOURCE:
THIS DRAWING WAS DEVELOPED FROM DRAWING NO. 869D1-C11 REV. 7, BY HARZA ENGINEERING COMPNAY, CHICAGO, ILLINOIS, DATED AUG. 1979, PROVIDED BY MIDWEST GENERATION.
ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE. PIPING AND OTHER UTILITY LOCATIONS ARE APPROXIMATE.

	REVISION:	DATE:	APP'D BY:
6.			
5.			
4.	ASBUILT	.	.
3.	ISSUED FOR CONSTRUCTION	08/28/09	HMS
2.	ADDENDUM NO. 1	09/15/08	HMS
1.	ISSUED FOR BID	08/20/08	HMS
0.	ISSUED FOR PERMIT	07/15/08	HMS

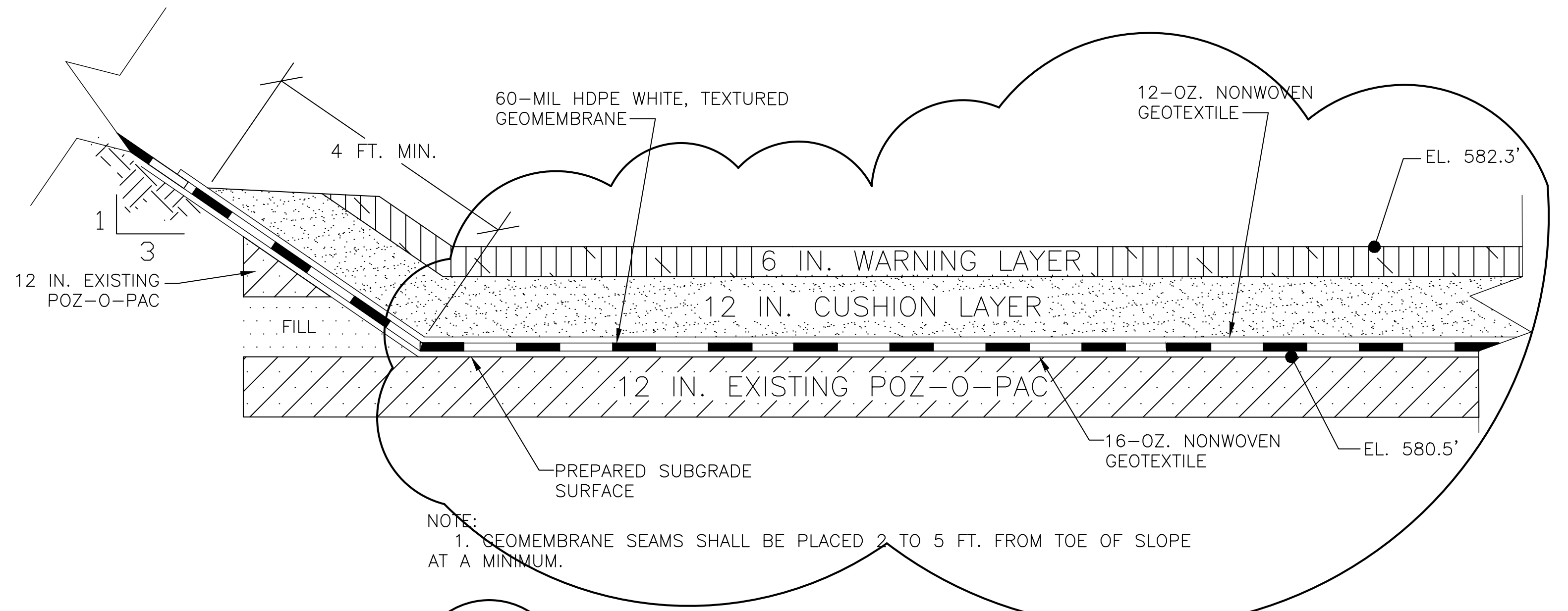
NATURAL
RESOURCE
TECHNOLOGY

PROJECT NO.
1900
DRAWN BY:
RLH/KNW 11/30/09
CHECKED BY:
RJG 11/30/09
APPROVED BY:
.

WARNING LAYER PLAN

SOUTH ASH POND LINER REPLACEMENT
MIDWEST GENERATION
WILL COUNTY GENERATING STATION
ROMEOVILLE, ILLINOIS

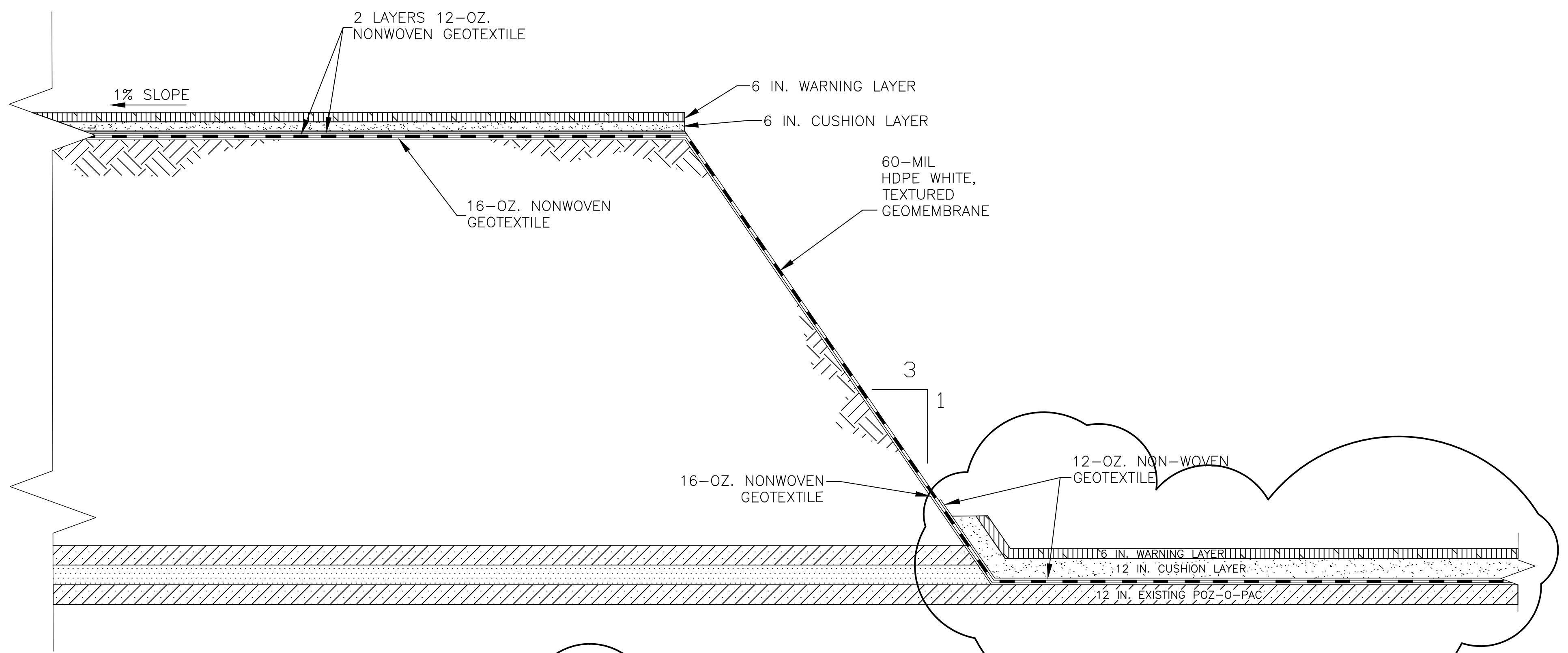
DRAWING NO: D1900C030-04
REFERENCE: .
SHEET NO.
C030



NOTE:
1. GEOMEMBRANE SEAMS SHALL BE PLACED 2 TO 5 FT. FROM TOE OF SLOPE AT A MINIMUM.

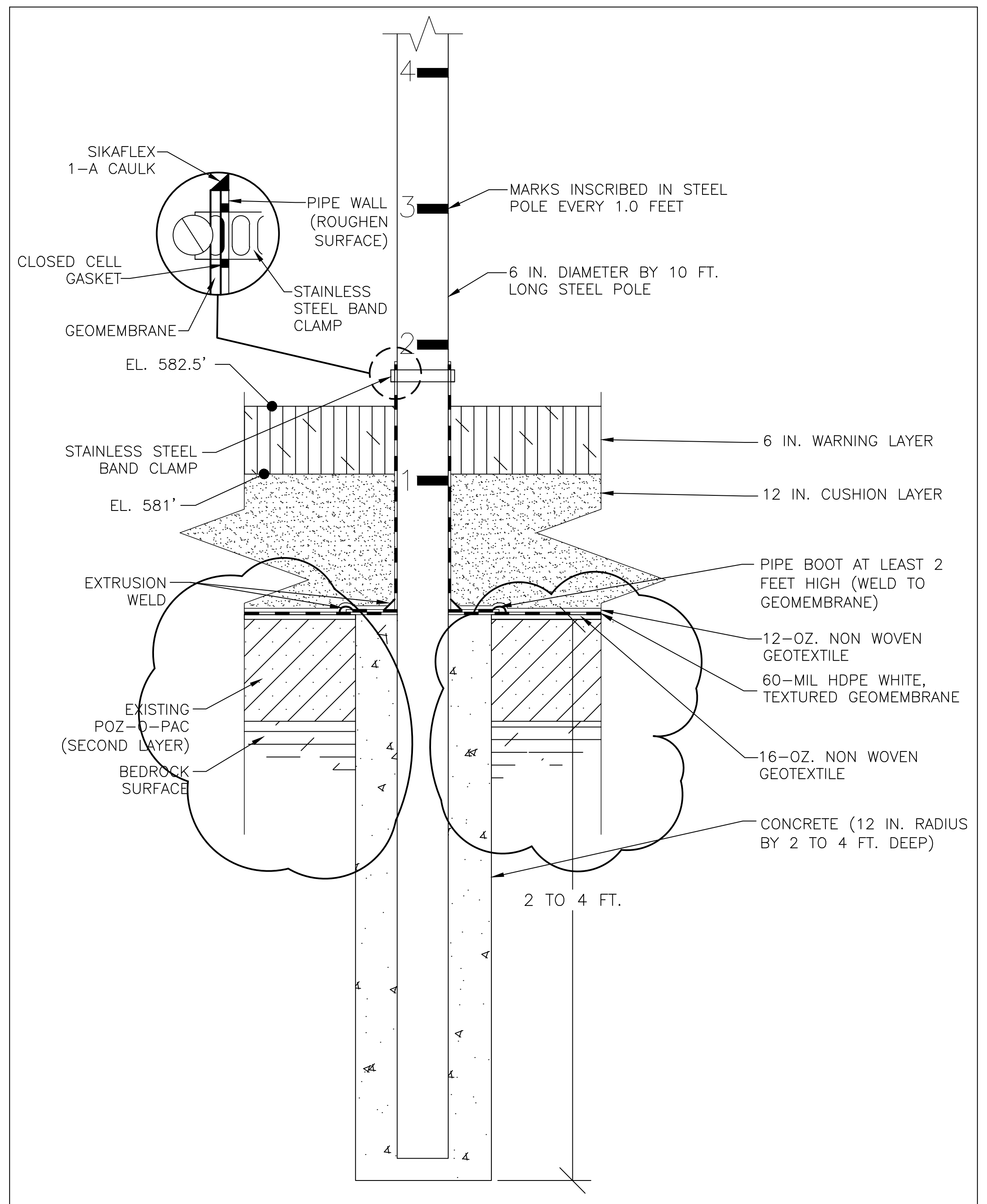
A / C030 SLOPE TRANSITION SECTION

NOT TO SCALE



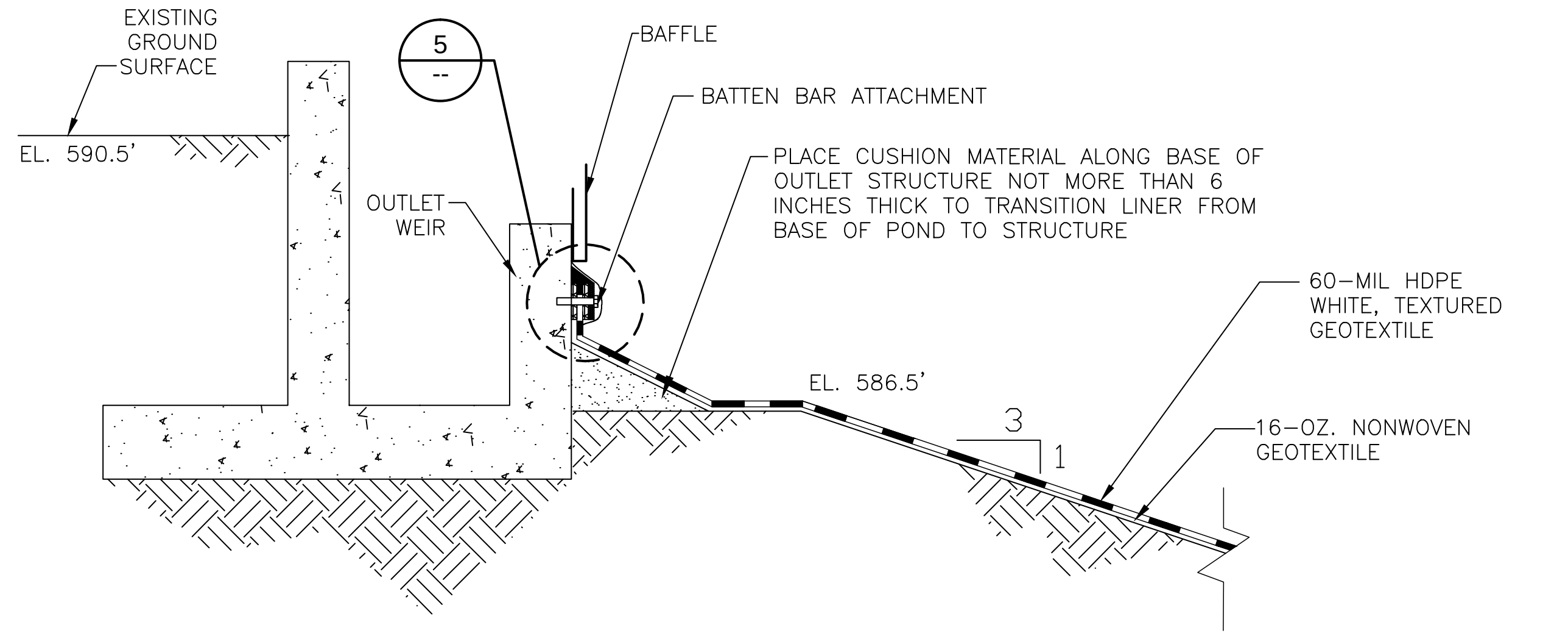
B / C030 RAMP SECTION

NOT TO SCALE



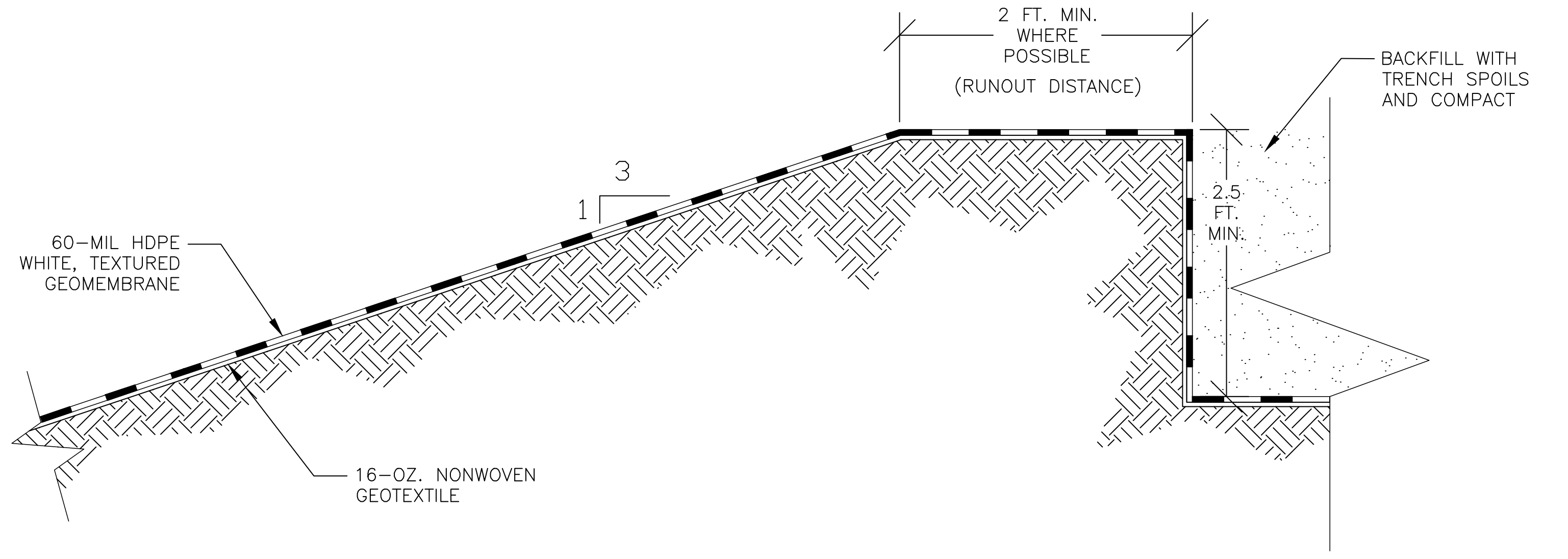
1 / C020 MARKER POST DETAIL

NOT TO SCALE



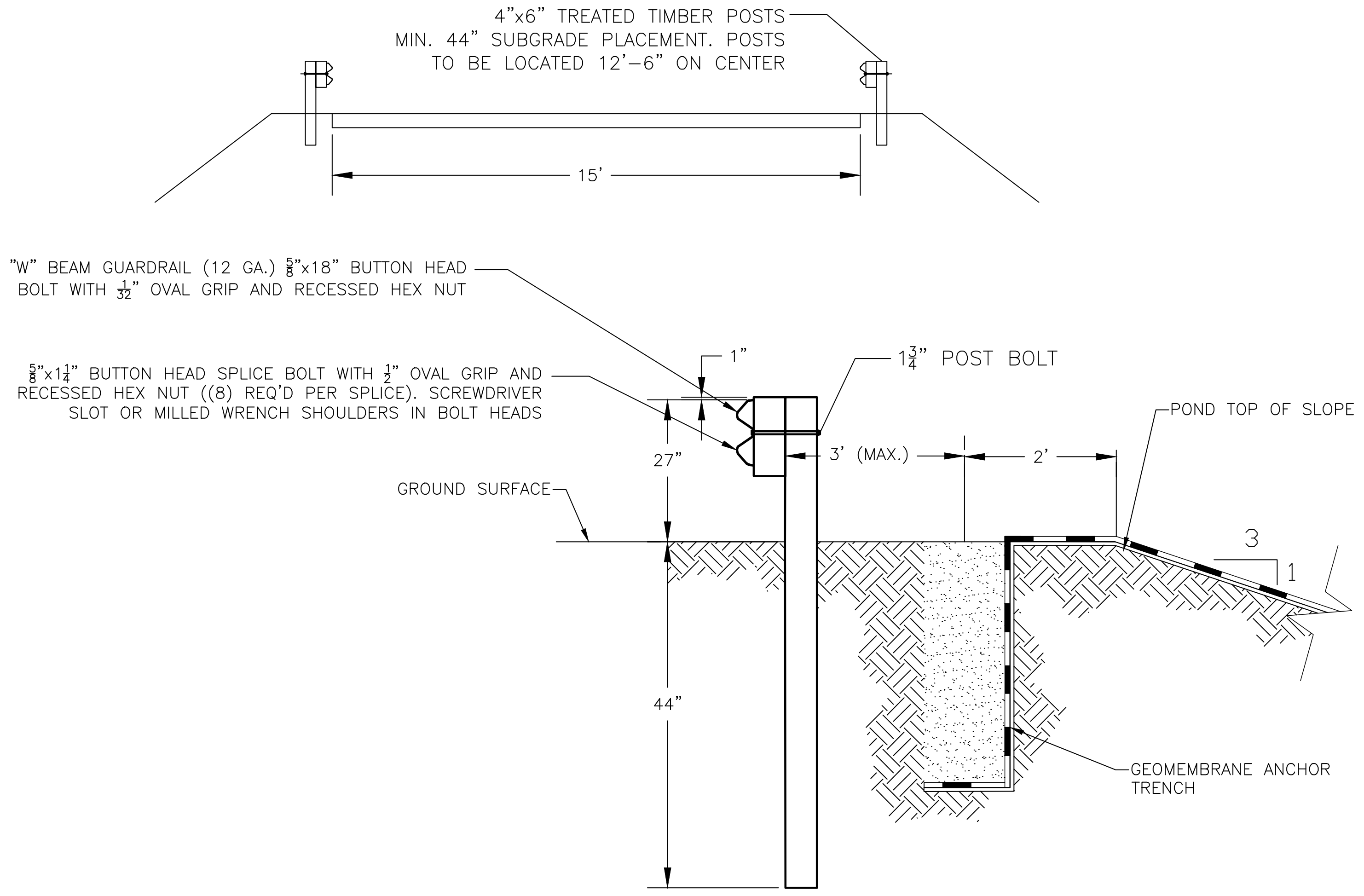
2 / C030 OUTLET WEIR DETAIL

NOT TO SCALE



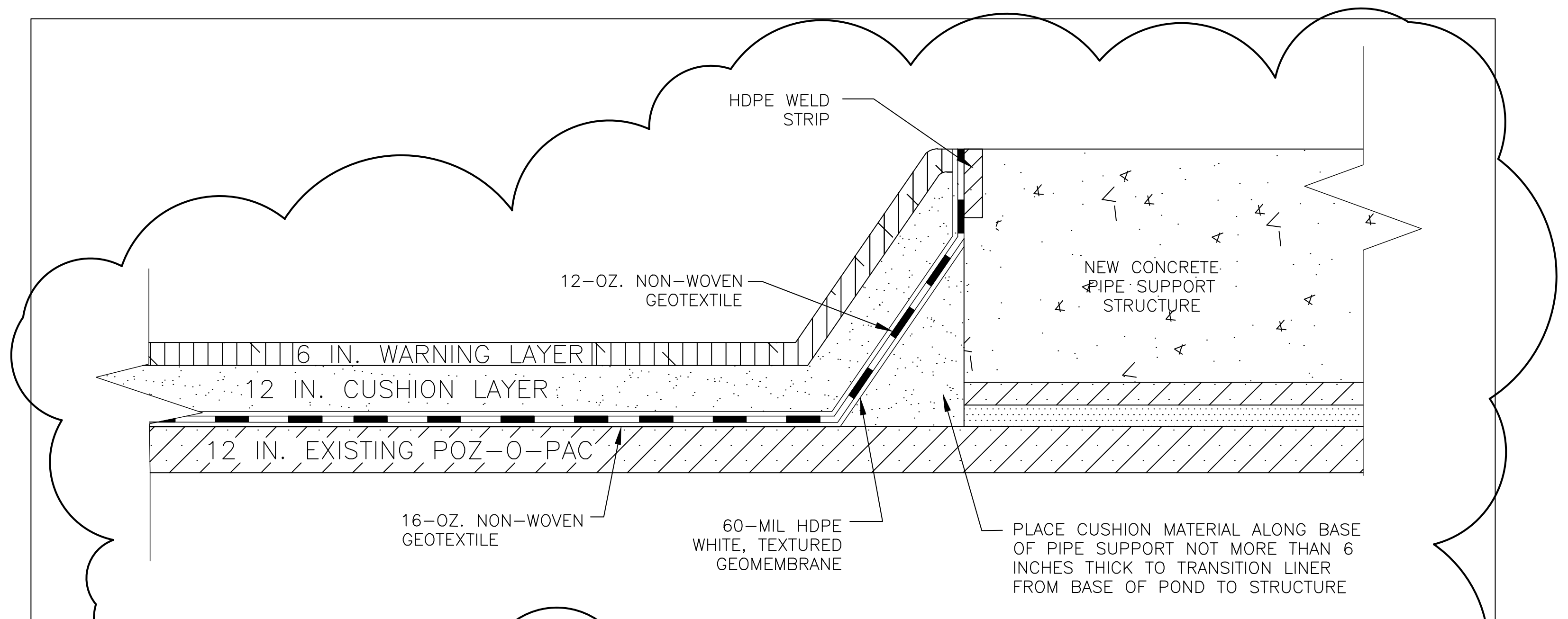
3 / C030 ANCHOR TRENCH DETAIL

NOT TO SCALE



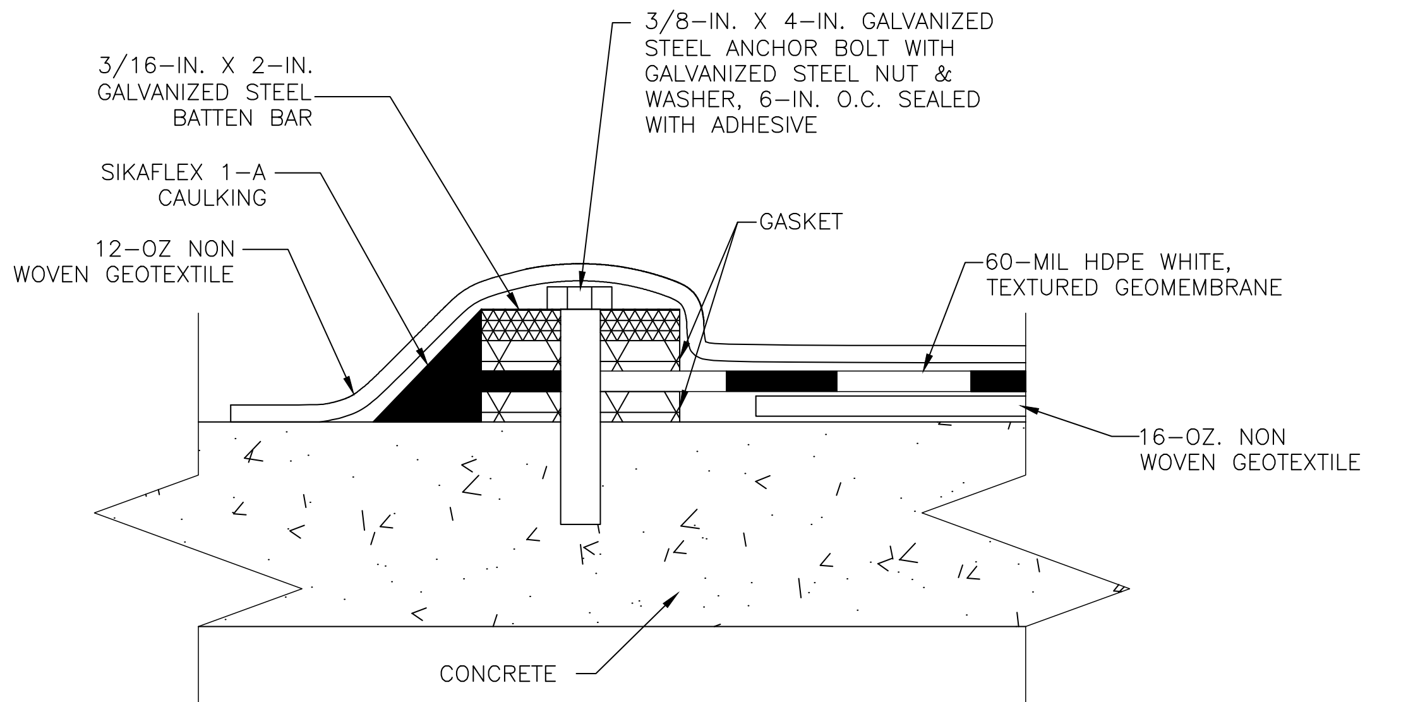
6 / C030 GUARDRAIL DETAIL

NOT TO SCALE



4 / C030 NEW PIPE SUPPORT DETAIL

NOT TO SCALE



NOTE:
1. ANCHOR BOLTS 6 IN. ON CENTER.

5 / -- BATTEN BAR ATTACHMENT

NOT TO SCALE

6.			
5.			
4.	RECORD DOCUMENTATION FOR SOUTH ASH POND 3	12/30/09	HMS
3.	ISSUED FOR CONSTRUCTION	08/28/09	HMS
2.	ADDENDUM NO. 1	09/15/08	HMS
1.	ISSUED FOR BID	08/20/08	HMS
0.	ISSUED FOR PERMIT	07/15/08	HMS
REVISION:		DATE:	APP'D BY:

NATURAL
RESOURCE
TECHNOLOGY

PROJECT NO. 1900
DRAWN BY: RLH/KNW 6/23/08
CHECKED BY: EJT 6/23/08
APPROVED BY: HMS 7/15/08

DETAILS AND SECTIONS

SOUTH ASH POND LINER REPLACEMENT
MIDWEST GENERATION
WILL COUNTY GENERATING STATION
ROMEOVILLE, ILLINOIS

DRAWING NO: D1900C031-04
REFERENCE: \bids-con
SHEET NO. C031

ATTACHMENT 3

2021 STRUCTURAL STABILITY & FACTOR OF SAFETY ASSESSMENT

STRUCTURAL STABILITY AND FACTOR OF SAFETY ASSESSMENT
ASH PONDS 1N, 1S, 2S, AND 3S, WILL COUNTY STATION
SEPTEMBER 2021

This Structural Stability and Factor of Safety Assessment report has been prepared pursuant to the coal combustion residuals (CCR) rule codified in Title 35 of the Illinois Administrative Code, Section 845.440(a) effective as of April 21, 2021 for North Ash Pond 1 and South Ash Pond 1, South Ash Pond 2, and South Ash Pond 3 (herein referred to as Pond(s) 1N, 1S, 2S, and 3S) at Will County Station in Romeoville, Illinois (Station). The purpose of this project is to perform the initial structural stability and factor of safety assessments for the ponds by a licensed professional engineer. Civil & Environmental Consultants, Inc. (CEC) completed this structural stability and factor of safety assessment as described in the following sections.

1.0 REGULATION REQUIREMENTS - SECTIONS 845.450 AND 845.460

In accordance with Sections 845.450 and 845.460, owners or operator of a CCR impoundment are required to conduct initial and annual structural stability assessments to document whether the design, construction, operation, and maintenance of the CCR surface impoundment is consistent with recognized and generally accepted engineering practices for the maximum volume of CCR and CCR wastewater which can be impounded; and to conduct an initial and annual safety factor assessment for each CCR surface impoundment and document whether the calculated factors of safety for each CCR surface impoundment achieve the minimum safety factors specified for the critical cross section of the embankment.

2.0 SITE CONDITIONS

Ponds 1N, 1S, 2S, and 3S are located at Will County Station, 529 East 135th Street in Romeoville, Will County, Illinois and situated south of 135th Street between the Des Plaines River and the Chicago Sanity and Ship Canal, see Figure 1. Basic information for each of the ponds are provided in Table 1. The ponds are of similar construction, size, and age. Each pond is constructed with a concrete weir spillway along the west half. Gravel access roads are located along the sides of the ponds.

Table 1 - Ash Pond Construction

Pond ID	Year of Original Construction	Dimension (ft x ft)	Depth (ft)	Capacity (ft^3)	Status
Pond 1N	1977	167 x 333	7	520,000	Closed
Pond 1S	1977	300 x 195	7	460,000	Closed
Pond 2S	1977	350 x 178	7	510,000	Active
Pond 3S	1977	234 x 322	7	530,000	Inactive

Based on information provided by Station personnel, the ponds were originally constructed in 1977, and have not undergone significant changes in the geometry. The original operation was designed to receive bottom ash via sluicing with wastewater treated in the wastewater treatment plant and discharged to the Chicago Sanitary and Ship Canal through the permitted National Pollutant Discharge Elimination System Outfall 002.

Ponds 1N and 1S were closed after the shutdown of Unit 1 and Unit 2, respectively. Pond 2S is still active, and at the time of our inspection, Pond 3S was inactive. The ponds are inspected weekly by the environmental specialist including checking the water level in the ponds.

3.0 STRUCTURAL STABILITY ASSESSMENT - SECTION 845.450

The following sections describe the structural stability assessment.

3.1 Stable Foundation and Abutments - Section 845.450(a)(1)

This assessment indicates the soils forming the pond foundations are stable. Soils data from soil boring logs and monitoring well logs within the vicinity of the ponds show the foundations consist of random sandy clay and gravel fill over weathered limestone bedrock. Inspection of the ponds did not show signs of distress due to settlement of the underlying foundation soils.

The ponds are partially incised and supported by earthen embankments. These type of basins constructed with earthen berms do not require abutments, and therefore consideration of abutment design, construction, and operation is not required.

3.2 Adequate Slope Protection - Section 845.450(a)(2)

Ponds 1N, 1S, 2S, and 3S are constructed with concrete overflows on the south end of each pond and the earthen bottom and sidewalls are protected with Poz-o-Pac liner. Additionally, Ponds 2S and 3S are also protected with a flexible membrane liner that provides adequate protection of the interior slopes against surface erosion, wave action, and adverse effects of sudden drawdown. From our inspection, Pond 2S has a protective layer comprised of concrete filled flexible reinforcement grid which is placed over a 6-inch warning layer, 12-inch cushion layer, and a 60 mil textured flexible membrane liner; while Pond 3S has been lined with flexible membrane liner. Our inspection of the ponds showed no signs of erosion.

3.3 Dike Compaction - Section 845.450(a)(3)

As-built construction documents for the initial construction of the ponds are unavailable. It would be standard practice for the dikes to be mechanically compacted to a density sufficient to withstand the range of loading conditions in the ponds. This is supported by the consideration that the ponds have been in operation since the 1977, and that the station has no record of observed distresses or repairs. Furthermore, the initial inspection of the dikes did not shows signs of distress that would be indicative of improperly placed and/or loosely compacted soils.

3.4 Downstream Slope Protection - Section 845.450(a)(4)

Consistent with Section 845.430, the basin slope protection consists of a combination of riprap and vegetative cover over the downstream slopes. Inspection shows the slope protection is maintained; protective against surface erosion, wave action, and adverse effect of rapid drawdown. At the time of inspection, the woody vegetation was observed on the downstream slope. Grassy vegetation did not exceed 12 inches in height.

3.5 Spillway - Section 845.450(a)(5)

Although each of the ponds are constructed with a concrete overflow connected to the on-site wastewater treatment plant, the ponds have not been designed or constructed with a spillway. Section 845.450 specifies a single spillway or a combination of spillways configured as specified in Subsection (a)(5)(A), and that the combined capacity of all spillways must be designed, constructed, operated, and maintained to adequately manage flow during and following the peak discharge from the event specified in Subsection (a)(5)(B). Not having an spillway is considered a deficiency in accordance with the Section 845.450(a)(5). Our inspection shows the ponds have been constructed and operated without incident since 1977, without any spillway, and that water levels are maintained at the level of the overflow.

3.6 Structural Integrity of Hydraulic Structures - Section 845.450(a)(6)

Although each of the ponds are constructed with a concrete overflow connected to the wastewater treatment plant, the pipe leading from the overflow is either a 36-inch (Ponds 2S and 3S) or 48-inch (Ponds 1N and 1S) diameter pipe that passes through earthen embankment. At the time of our inspection, the water flowed into the pipe and evidence showing the structural integrity of the pipe free of significant deterioration, deformation, distortion, bedding deficiencies, sedimentation, and debris could not be made. At the time of this report, inspection reports for the overflow were unavailable.

3.7 Down Stream Slopes Adjacent To Water Bodies - Section 845.450(a)(7)

The Des Plaines River is downstream of the ponds and a stability analysis was performed for both a low pool and rapid draw down condition. The stability analysis shows that the embankment is designed and constructed to maintain stability during both low pool and rapid draw down conditions.

3.8 Structural Stability Assessment Deficiencies

Structural deficiencies associated with the ponds were not identified during this initial structural stability assessment. Inspection records for the pipe were unavailable. Although our inspection did not identify distress that would suggest the existence of a structural deficiency, the overflow pipe should be inspected in accordance with Section 845.450(a)(6).

3.9 Annual Inspection Requirement

In completing the initial structural stability assessment, the ponds were inspected for signs of distress that would have the potential to disrupt operation and safety. No signs of distress that would have the potential to disrupt operation and safety of the ponds were identified. This inspection can suffice for the 2021 inspection.

4.0 SAFETY FACTOR ASSESSMENT - SECTION 845.460

In accordance with Section 845.460, the owner or operator of a CCR surface impoundment must conduct initial and annual safety factor assessments for each CCR surface impoundment and document whether the calculated factors of safety for each CCR surface impoundment achieve the minimum safety factors specified for the critical cross section of the embankment. The critical cross section is the cross section anticipated to be the most susceptible of all cross sections to structural failure based on appropriate engineering considerations, including loading conditions. The safety factor assessments must be supported by appropriate engineering calculations.

4.1 Slope Stability Methodology

Slope stability software Slide2 was used to calculate the minimum factor of safety for each pond at Cross Section 1N-1N, 1S-1S, 2S-2S, and 3S-3S, respectively. The program uses 2D limit equilibrium methods to determine the minimum factor of safety against slope instability. The auto-refine, non-circular search method with optimization was used utilizing Spencer's method to calculate the factor of safety for each design criteria scenario, as discussed below. For each section analyzed, the program searches for the sliding surface that procures the lowest factor of safety which is defined as the ratio of the shear forces and moment resisting movement along the sliding surface to the forces and moments driving the instability.

Soil data provided by the station personnel was used to develop soil properties for the slope stability analysis. The data shows the soil materials in the vicinity of the ponds consists of up to approximately 5 feet of random clay fill overlying weathered and unweathered limestone bedrock.

4.2 Slope Stability Analysis - Section 845.460

Four cases were analyzed to satisfy the safety factor assessment as per Section 845.460(a)(2) through (a)(4).

4.2.1 Static, Long-Term - Section 845.460(a)(2)

The static, long-term condition with the maximum surcharge loading on the embankment was evaluated. The static, long-term analysis included a pool elevation at 592.5 feet mean sea level and a groundwater elevation at 580.5 feet mean sea level.

4.2.2 Static, Maximum Storage Pool - Section 845.460(a)(3)

The static, long-term, maximum storage pool condition with the maximum surcharge loading on the embankment was evaluated. The static, long-term analysis included a pool elevation set at the lowest points of the embankment crest, 589.5 feet mean sea level, and a groundwater elevation at 580.5 feet mean sea level.

4.2.3 Seismic - Section 845.460(a)(4)

Seismic analysis was performed by incorporating pseudo static seismic loading scenarios in the long-term global stability analysis calculations. A pseudo-static seismic horizontal load was applied to the long-term maximum storage pool loading condition model.

The seismic factor of safety is defined in the proposed CCR regulations as “the factor of safety (safety factor) determined using analysis under earthquake conditions using the peak ground acceleration (PGA) for a seismic event with a 2% probability of exceedance in 50 years, equivalent to a return period of approximately 2,500 years, based on the U.S. Geological Survey (USGS) seismic hazard maps for seismic events with this return period for the region where the CCR surface impoundment is located”.

4.2.4 Liquefaction - Section 845.460(a)(5)

For dikes constructed of soils susceptible to liquefaction, the calculated liquefaction factor of safety must equal or exceed 1.20. Soils with potential for liquefaction typically consist of poorly drained fine-grained soils. Soil boring data indicate that the embankment and foundation soils consist of random sandy clay and gravel fill over shallow weathered limestone bedrock. These soil types are not susceptible to liquefaction. Additionally, the Poz-o-Pac liner system makes it unlikely the embankment would become saturated or inundated. Because the likelihood of liquefaction and associated shear strength loss of the embankment soils is very low, the liquefaction condition is represented by the static factor of safety analysis and a separate analysis was not performed.

4.3 Factor of Safety Assessment Results

Results of the slope stability analysis for the critical cross section of the ponds are summarized in Table 2, below, and presented in Figures 1 through 13. The results meet the factor of safety requirements presented in 845.460(a)(2) through (4).

Table 2: Safety Factor Results - Ponds 1N, 1S, 2S, and 3S

Loading Condition	Required FS	Calculated Factor of safety			
		1N	1S	2S	3S
Static, Long-Term 845.460(a)(2)	1.50	3.76	2.87	2.87	3.48
Static, Maximum Storage Pool 845.460(a)(3)	1.40	3.76	2.87	2.87	3.48
Seismic 845.460(a)(4)	1.00	1.89	1.77	2.11	2.56
Liquefaction 845.460(a)(5)	1.20	>1.20	>1.20	>1.20	>1.20

5.0 LIMITATIONS AND CERTIFICATION

This initial Structural Stability and Factor of Safety Assessment report was prepared to meet the requirements of Sections 845.450 and 845.460 of the Illinois Administrative Code draft Title 35 Subtitle G Subchapter I Subchapter j Coal Combustion Waste Surface Impoundments, and was prepared under the direction of Mr. M. Dean Jones, P.E.

By affixing my seal to this, I do hereby certify to the best of my knowledge, information, and belief that the information contained in this report is true and correct. I further certify I am licensed to practice in the State of Illinois and that it is within my professional expertise to verify the correctness of the information. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment.

Seal:

MAURICE DEAN JONES, JR.
062-051317

Signature: Dean Jones

Name: M. Dean Jones, P.E.

Date of Certification: September 23, 2021

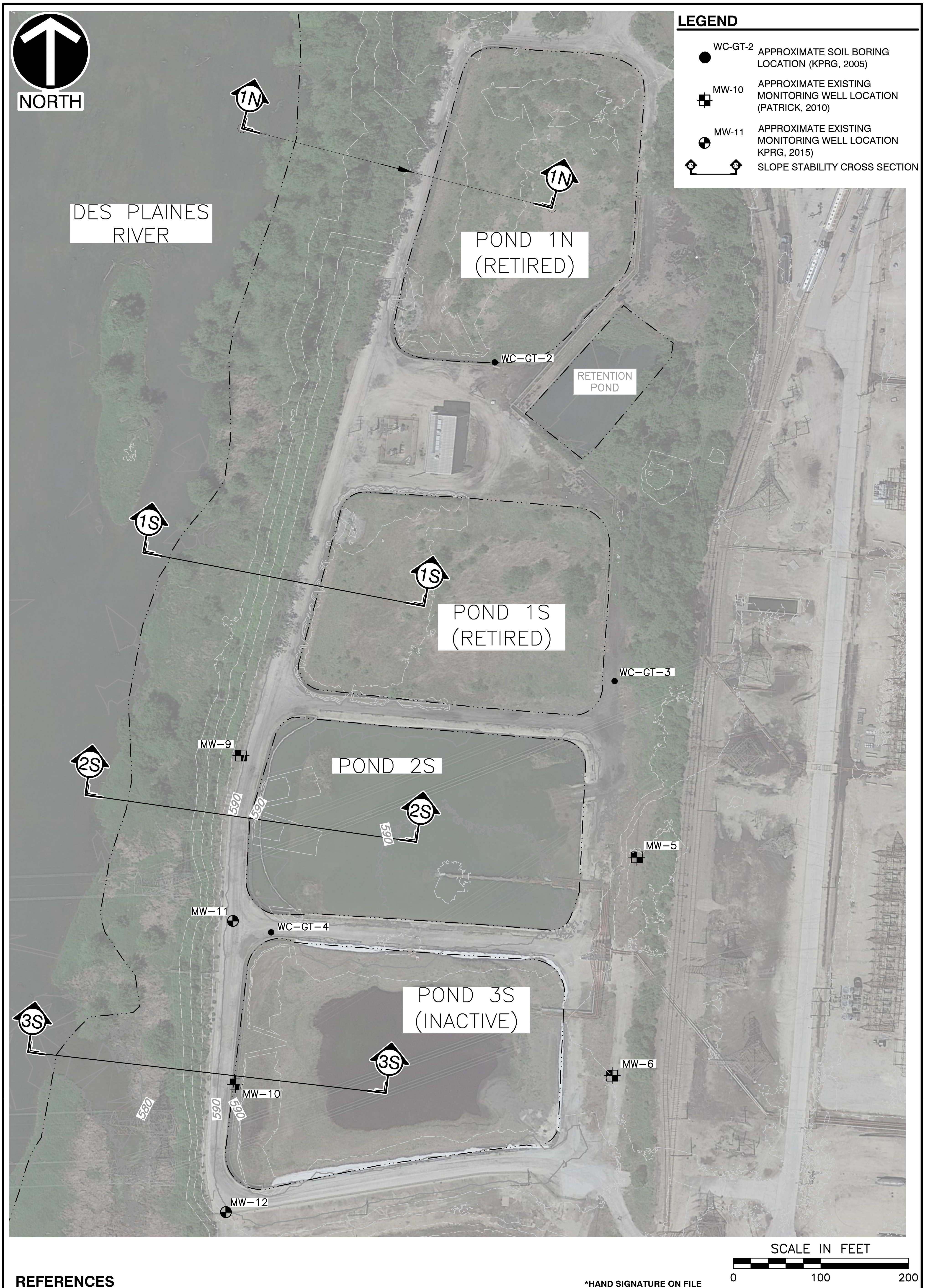
Illinois Professional Engineer No.: 062-051317

Expiration Date: November 30, 2021

Enclosure: Figures

FIGURES

P:\310-000\312-192\-CADD\Dwg\CV01 WILL COUNTY\312192-CV01-C200 EXISTING SITE CONDITIONS - WILL COUNTY.dwg{1} LS:(9/23/2021 - ccase) - LP: 9/23/2021 9:16 AM



REFERENCES

1. TOPOGRAPHIC INFORMATION BASED UPON LiDAR POINT CLOUD DATA FROM WILL COUNTY ILLINOIS LiDAR ACQUISITION 2014, ACCESSED AUGUST 2021.
2. AERIAL IMAGE PROVIDED BY GOOGLE EARTH, DATED MAY 29, 2021, ACCESSED AUGUST 20, 2021.

*HAND SIGNATURE ON FILE

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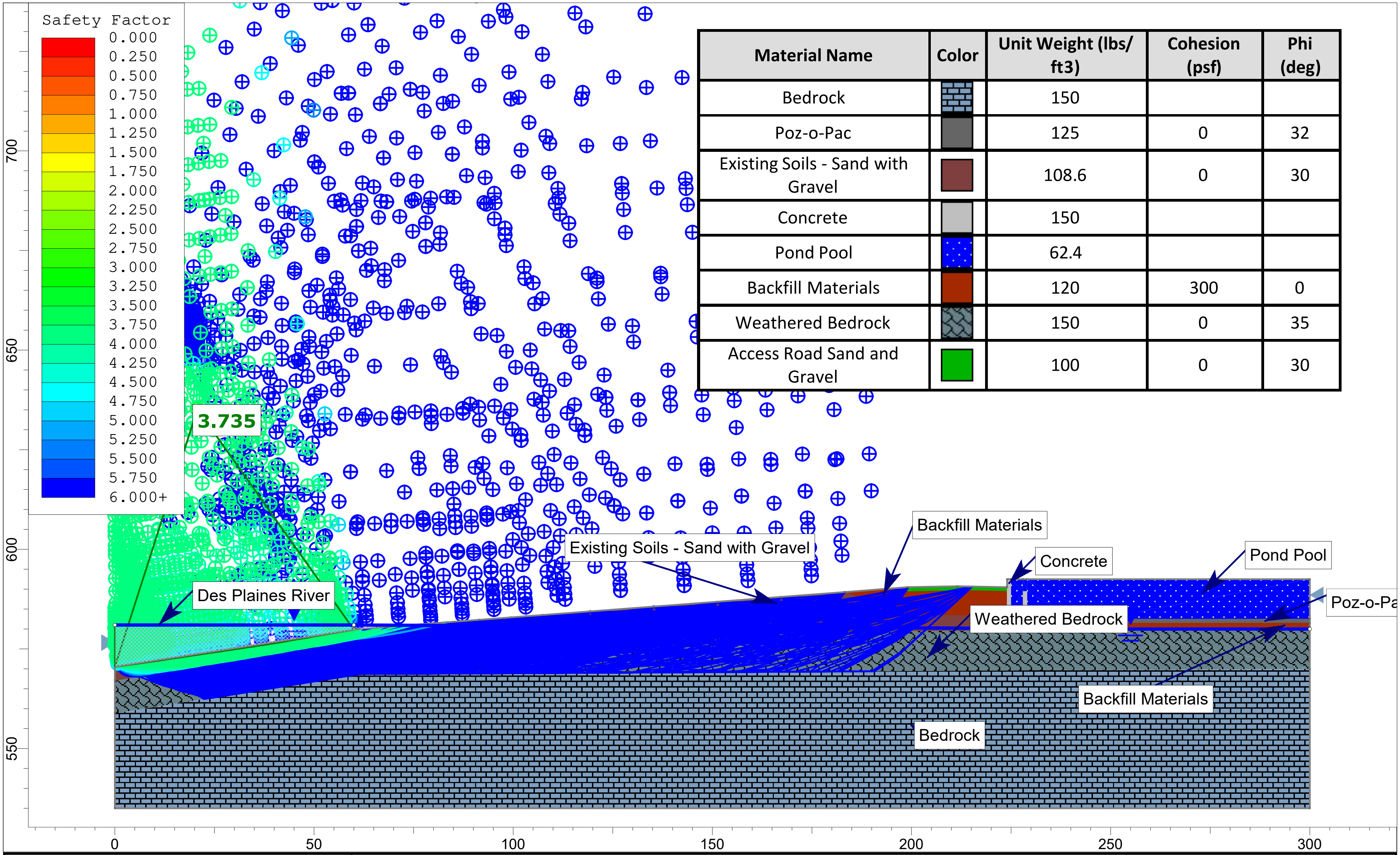
www.cecinc.com

MIDWEST GENERATION LLC
WILL COUNTY STATION
PONDS 1N, 1S, 2S, AND 3S SLOPE STABILITY
ROMEOVILLE, WILL COUNTY, ILLINOIS

SITE PLAN WITH CROSS-SECTIONS

DRAWN BY: CAC	CHECKED BY: CAC	APPROVED BY: MDJ*	FIGURE NO.:
DATE: SEPTEMBER 2021	DWG SCALE: 1"=100'	PROJECT NO: 312-192.0230	1



Material Name	Color	Unit Weight (lbs/ ft3)	Cohesion (psf)	Phi (deg)
Bedrock	▦	150		
Poz-o-Pac	⬛	125	0	32
Existing Soils - Sand with Gravel	🟫	108.6	0	30
Concrete	⬜	150		
Pond Pool	🟦	62.4		
Backfill Materials	🟥	120	300	0
Weathered Bedrock	▨	150	0	35
Access Road Sand and Gravel	🟩	100	0	30

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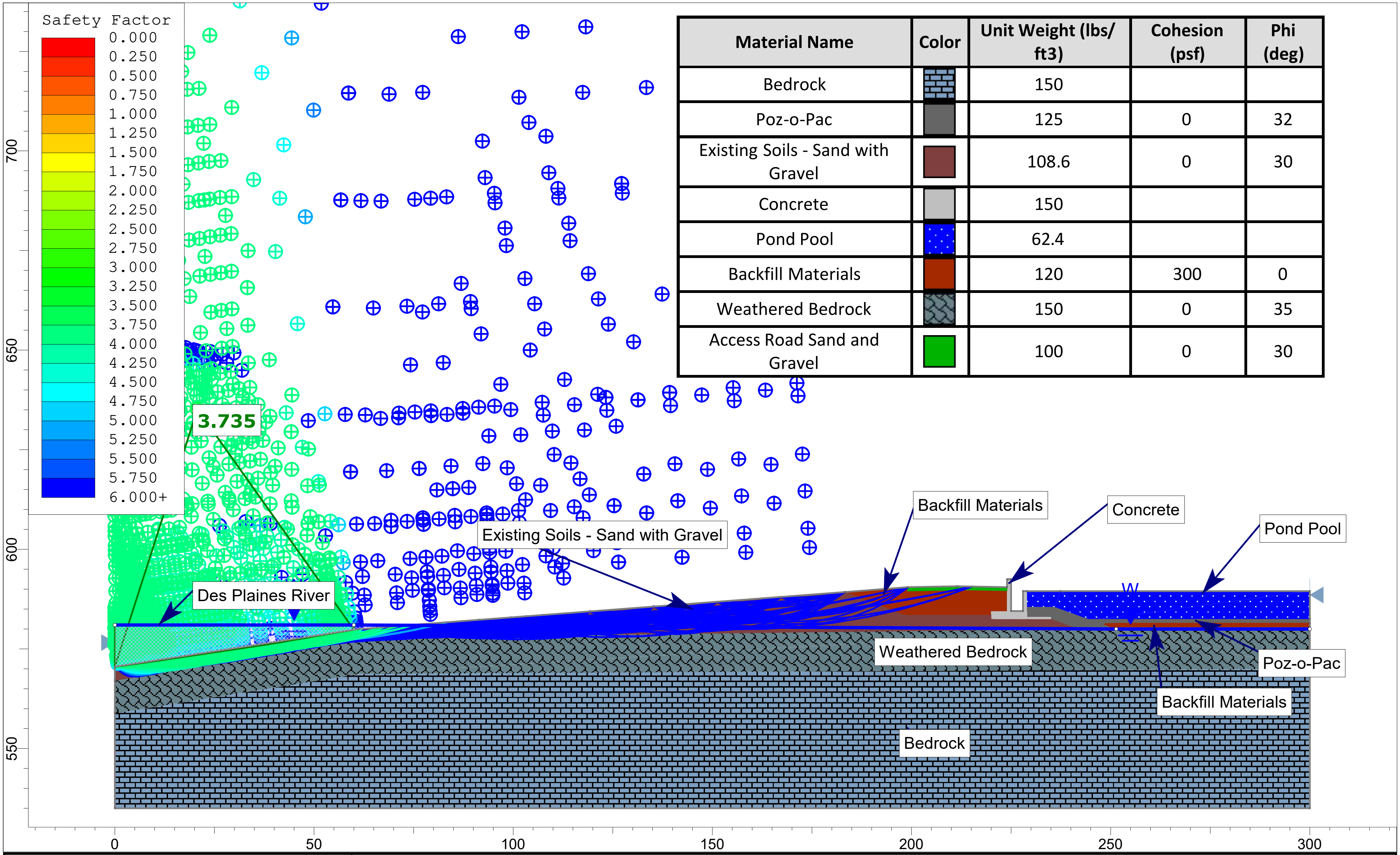
Figure 2: Pond 1N Slope Stability Analysis

Analysis Spencer
Scale: 1:400
Scenario Pond 1N, Long-Term, Maximum Surcharge Pool

Drawn By CAC
Checked By: MDB
Approved By: MDJ
Company Civil & Environmental Consultants, Inc.

Date 08/25/2021
Date: 9/23/2021
Date: 9/23/2021
File Name 312192-WC-Pond 1N.slmd



Material Name	Color	Unit Weight (lbs/ ft3)	Cohesion (psf)	Phi (deg)
Bedrock	▦	150		
Poz-o-Pac	⬛	125	0	32
Existing Soils - Sand with Gravel	🟫	108.6	0	30
Concrete	⬜	150		
Pond Pool	🟦	62.4		
Backfill Materials	🟥	120	300	0
Weathered Bedrock	▨	150	0	35
Access Road Sand and Gravel	🟩	100	0	30

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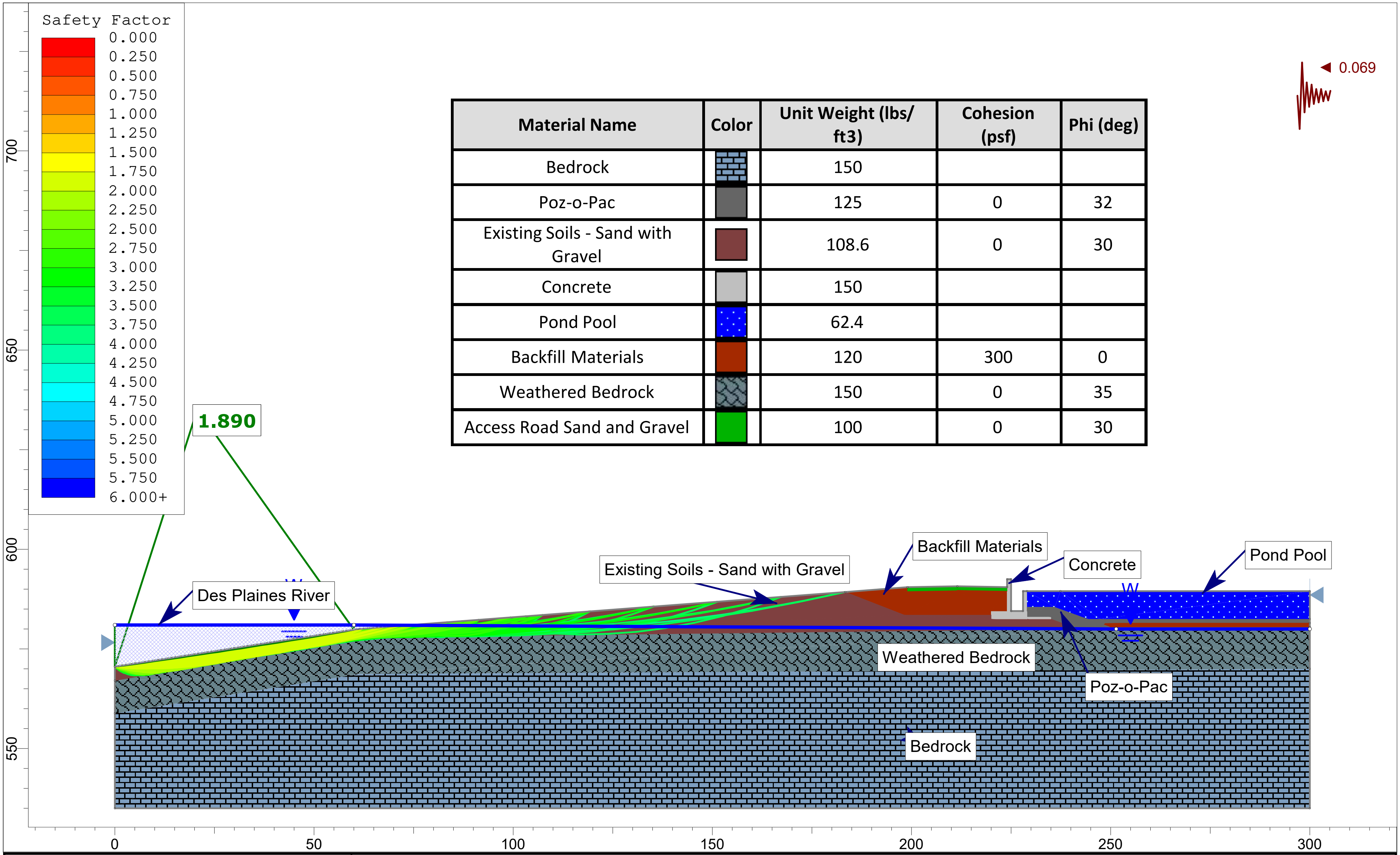
Figure 3: Pond 1N Slope Stability Analysis

Analysis	Spencer	*Scale:*	1:400			*Scenario*	Pond 1N, Long-Term, Maximum Storage Pool
Drawn By	CAC	*Checked By:*	MDB	*Approved By:*	MDJ	*Company*	Civil & Environmental Consultants, Inc.
Date	08/25/2021	*Date:*	9/23/2021	*Date:*	9/23/2021	*File Name*	312192-WC-Pond 1N.slmd



Material Name	Color	Unit Weight (lbs/ ft3)	Cohesion (psf)	Phi (deg)
Bedrock	▦	150		
Poz-o-Pac	⬛	125	0	32
Existing Soils - Sand with Gravel	🟫	108.6	0	30
Concrete	⬜	150		
Pond Pool	🟦	62.4		
Backfill Materials	🟥	120	300	0
Weathered Bedrock	▨	150	0	35
Access Road Sand and Gravel	🟩	100	0	30

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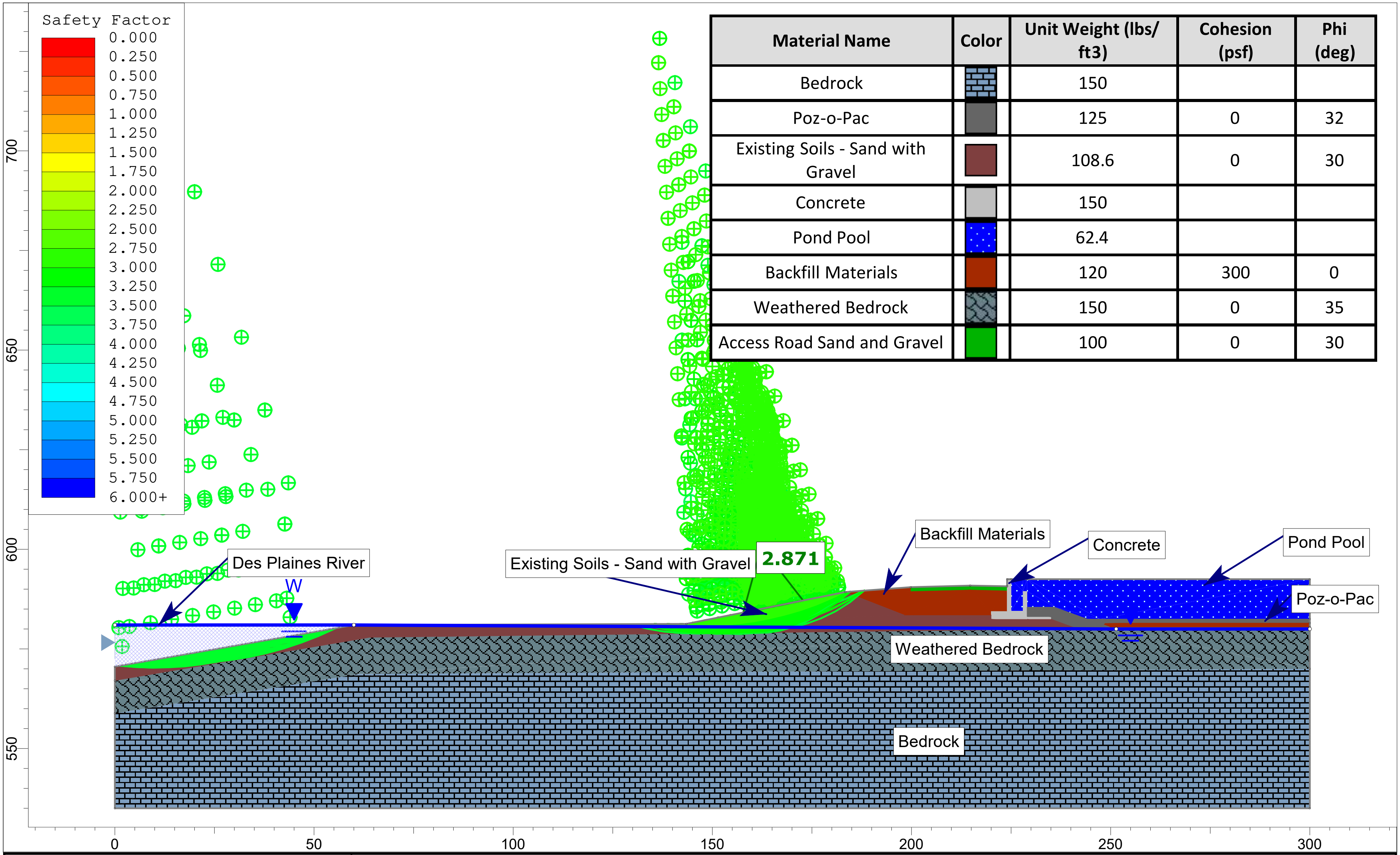
Figure 4: Pond 1N Slope Stability Analysis

Analysis Spencer
Scale: 1:400
Scenario Pond 1N, Long-Term, Maximum Storage Pool - Seismic
Drawn By CAC
Checked By: MDB
Approved By: MDJ
Company Civil & Environmental Consultants, Inc.
Date 08/25/2021
Date: 9/23/2021
Date: 9/23/2021
File Name 312192-WC-Pond 1N.slmd



Material Name	Color	Unit Weight (lbs/ ft3)	Cohesion (psf)	Phi (deg)
Bedrock	▦	150		
Poz-o-Pac	⬛	125	0	32
Existing Soils - Sand with Gravel	🟫	108.6	0	30
Concrete	⬜	150		
Pond Pool	🟦	62.4		
Backfill Materials	🟥	120	300	0
Weathered Bedrock	▨	150	0	35
Access Road Sand and Gravel	🟩	100	0	30

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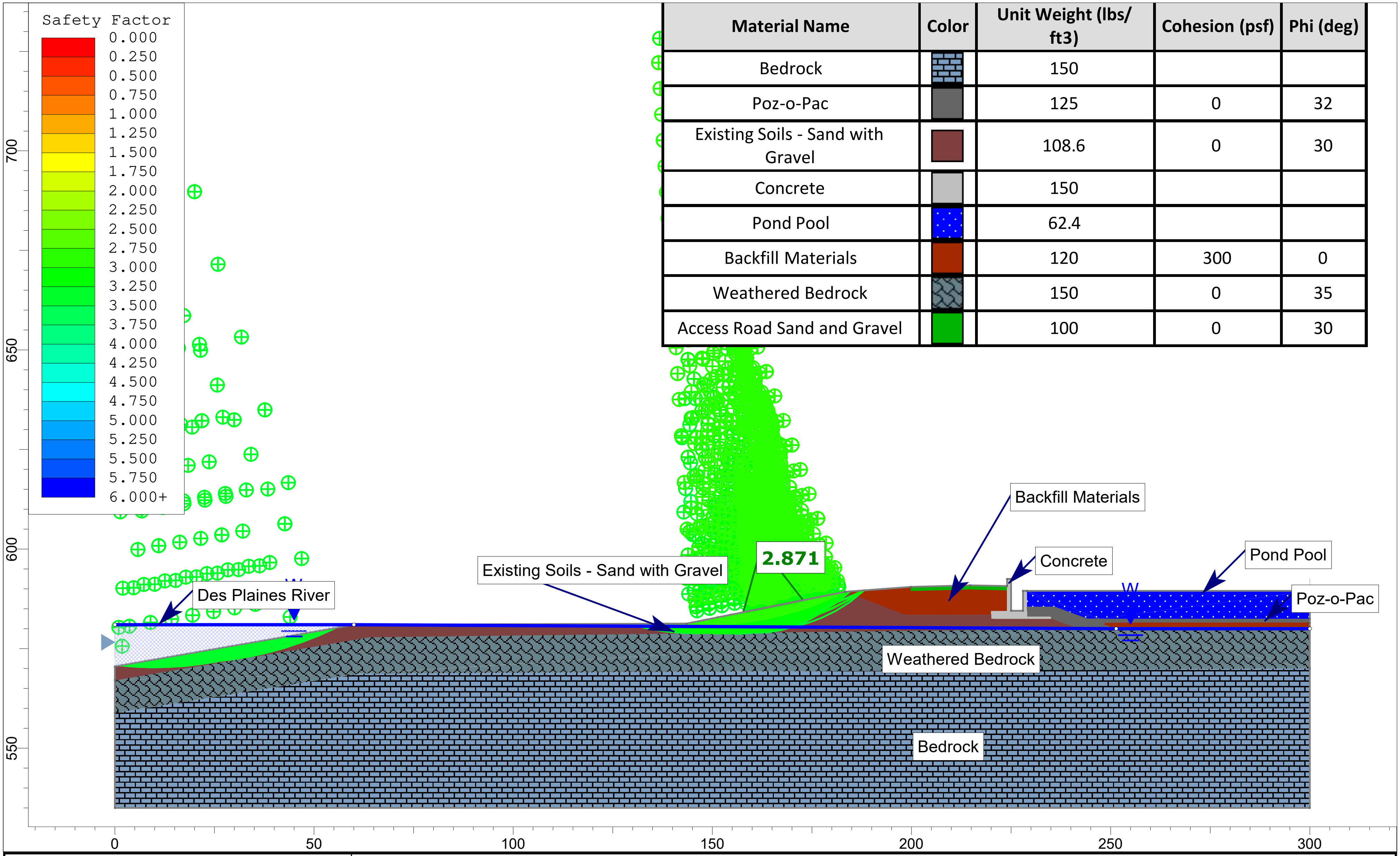
Figure 5: Pond 1S Slope Stability Analysis

Analysis	Spencer	*Scale:*	1:400	*Scenario*	Pond 1S, Long-Term, Maximum Surcharge Pool

Drawn By	CAC	*Checked By:*	MDB	*Approved By:*	MDJ	*Company*	Civil & Environmental Consultants, Inc.
Date	08/25/2021	*Date:*	9/23/2021	*Date:*	9/23/2021	*File Name*	312192-WC-Pond 1N.slmd



Material Name	Color	Unit Weight (lbs/ ft3)	Cohesion (psf)	Phi (deg)
Bedrock	▦	150		
Poz-o-Pac	⬛	125	0	32
Existing Soils - Sand with Gravel	🟫	108.6	0	30
Concrete	⬜	150		
Pond Pool	🟦	62.4		
Backfill Materials	🟥	120	300	0
Weathered Bedrock	▨	150	0	35
Access Road Sand and Gravel	🟩	100	0	30

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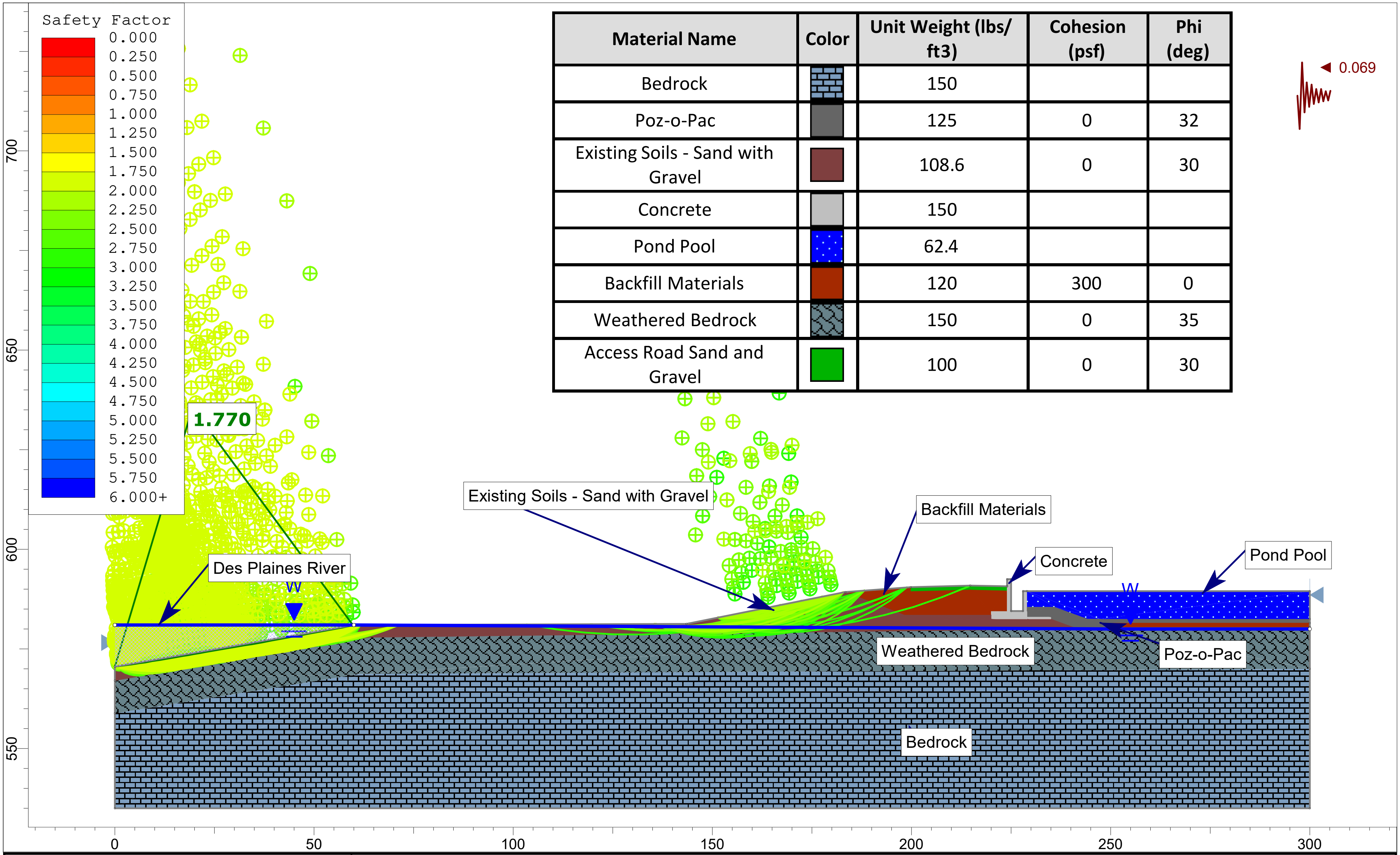
Figure 6: Pond 1S Slope Stability Analysis

Analysis	Spencer	*Scale:*	1:400	*Scenario*	Pond 1S, Long-Term, Maximum Storage Pool		
Drawn By CAC	*Checked By:* MDB	*Approved By:* MDJ	*Company* Civil & Environmental Consultants, Inc.				
Date 08/25/2021	*Date:* 9/23/2021	*Date:* 9/23/2021	*File Name* 312192-WC-Pond 1N.slmd				



Material Name	Color	Unit Weight (lbs/ft3)	Cohesion (psf)	Phi (deg)
Bedrock	▦	150		
Poz-o-Pac	⬛	125	0	32
Existing Soils - Sand with Gravel	🟫	108.6	0	30
Concrete	⬜	150		
Pond Pool	🟦	62.4		
Backfill Materials	🟥	120	300	0
Weathered Bedrock	▨	150	0	35
Access Road Sand and Gravel	🟩	100	0	30

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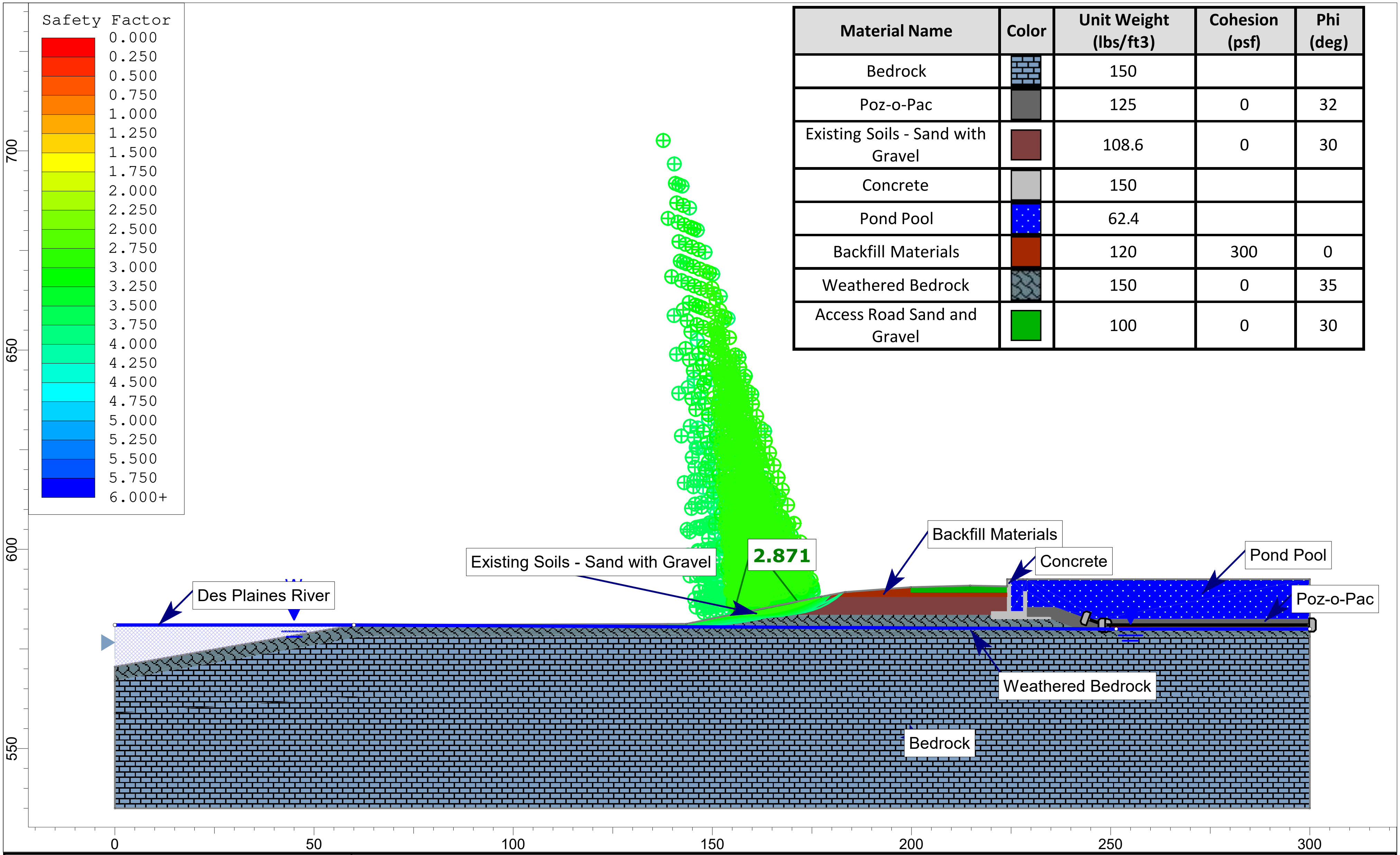
Figure 7: Pond 1S Slope Stability Analysis

Analysis	Spencer		*Scale:*	1:400		*Scenario*	Pond 1S, Long-Term, Maximum Storage Pool - Seismic
Drawn By	CAC	*Checked By:*	MDB	*Approved By:*	MDJ	*Company*	Civil & Environmental Consultants, Inc.
Date	08/25/2021	*Date:*	9/23/2021	*Date:*	9/23/2021	*File Name*	312192-WC-Pond 1N.slmd



Material Name	Color	Unit Weight (lbs/ft3)	Cohesion (psf)	Phi (deg)
Bedrock	▦	150		
Poz-o-Pac	■	125	0	32
Existing Soils - Sand with Gravel	🟫	108.6	0	30
Concrete	⬜	150		
Pond Pool	🟦	62.4		
Backfill Materials	🟥	120	300	0
Weathered Bedrock	▨	150	0	35
Access Road Sand and Gravel	🟩	100	0	30

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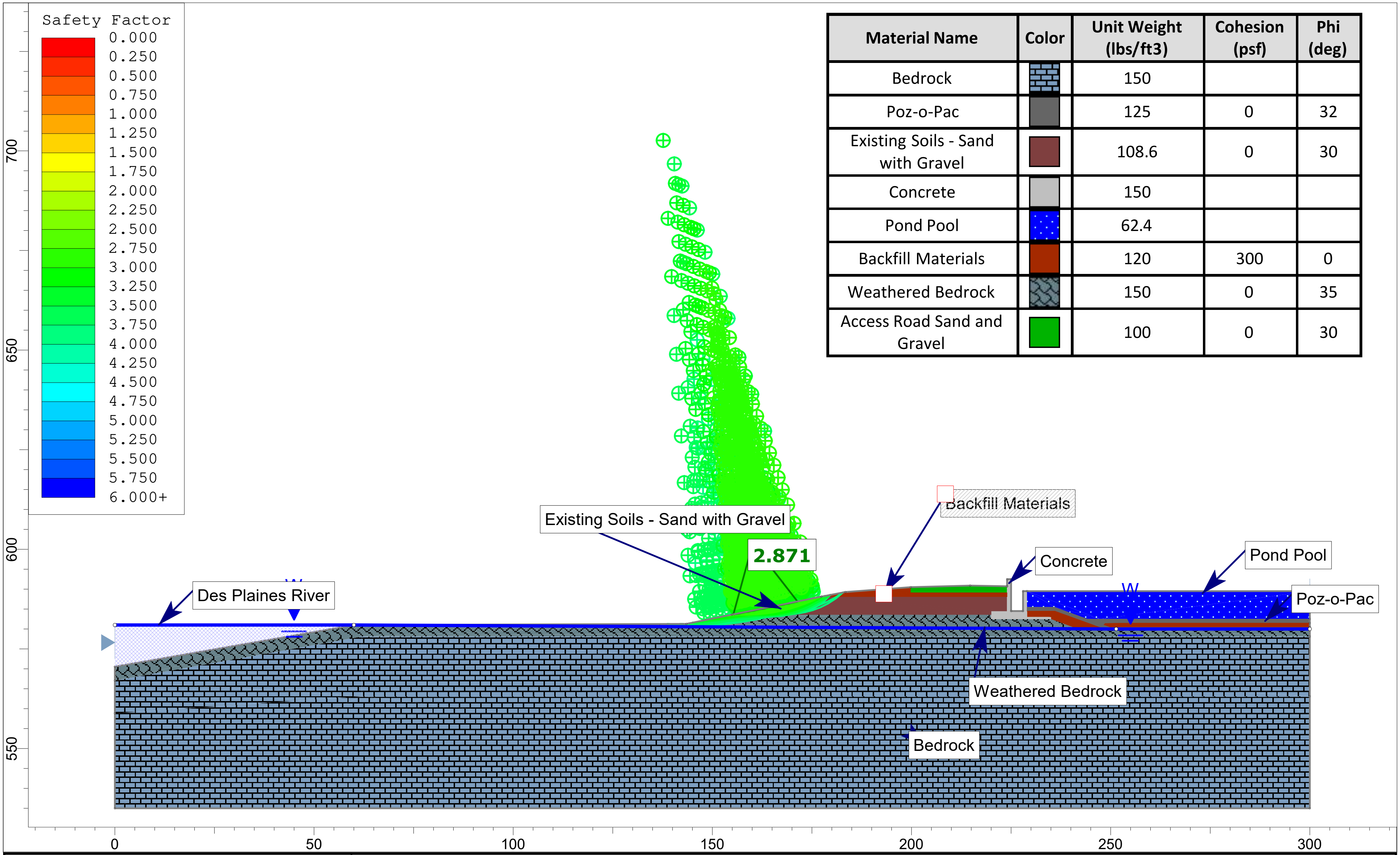
Figure 8: Pond 2S Slope Stability Analysis

Analysis	Spencer		*Scale:*	1:400		*Scenario*	Pond 2S, Long-Term, Maximum Surcharge Pool
Drawn By	CAC	*Checked By:*	MDB	*Approved By:*	MDJ	*Company*	Civil & Environmental Consultants, Inc.
Date	08/25/2021	*Date:*	9/23/2021	*Date:*	9/23/2021	*File Name*	312192-WC-Pond 1N.slmd



Material Name	Color	Unit Weight (lbs/ft3)	Cohesion (psf)	Phi (deg)
Bedrock	▦	150		
Poz-o-Pac	⬛	125	0	32
Existing Soils - Sand with Gravel	🟫	108.6	0	30
Concrete	⬜	150		
Pond Pool	🟦	62.4		
Backfill Materials	🟥	120	300	0
Weathered Bedrock	▨	150	0	35
Access Road Sand and Gravel	🟩	100	0	30

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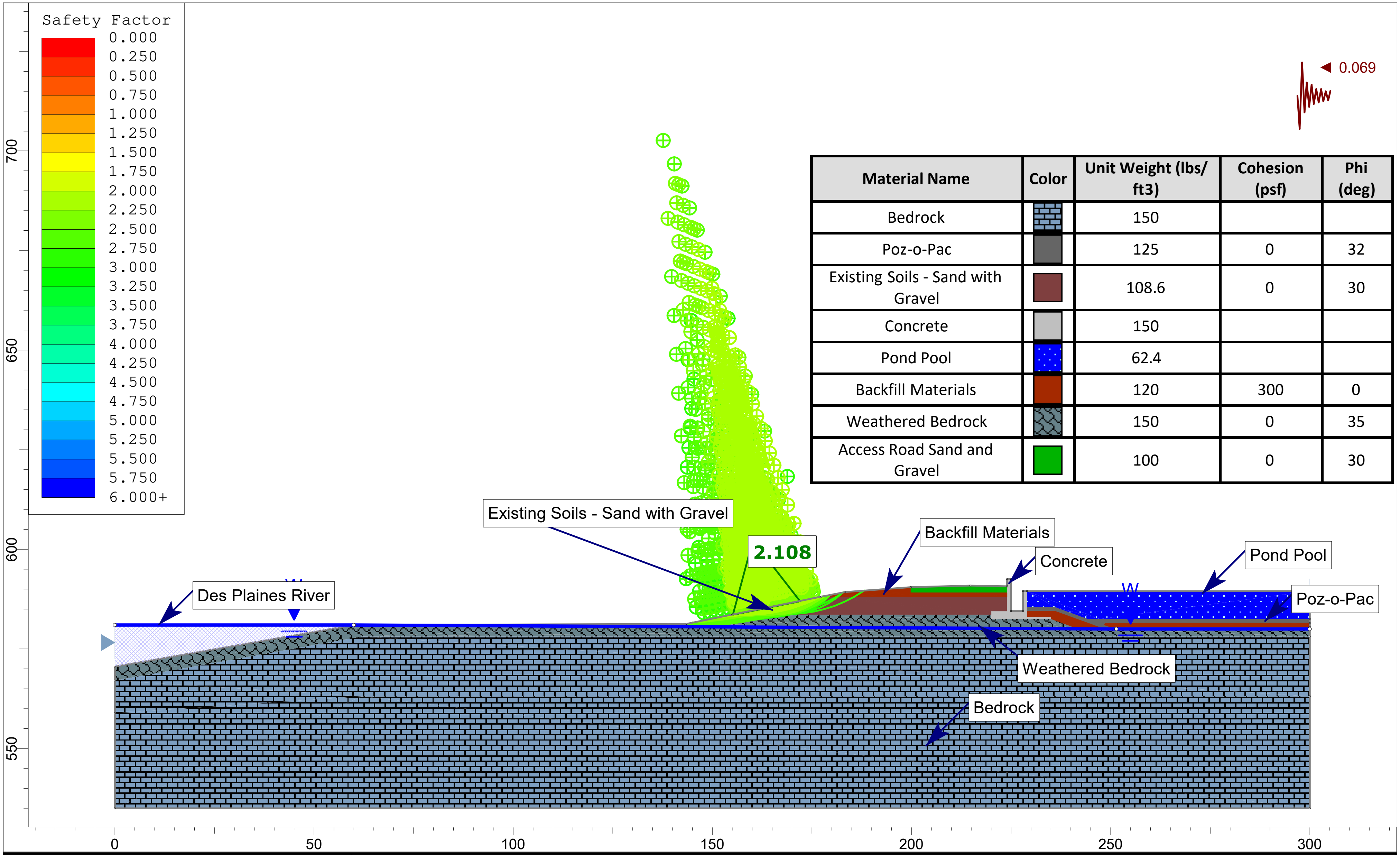
Project **Figure 9: Pond 2S Slope Stability Analysis**			
Analysis Spencer	*Scale:* 1:400	*Scenario* Pond 2S, Long-Term, Maximum Storage Pool	
Drawn By CAC	*Checked By:* MDB	*Approved By:* MDJ	*Company* Civil & Environmental Consultants, Inc.
Date 08/25/2021	*Date:* 9/23/2021	*Date:* 9/23/2021	*File Name* 312192-WC-Pond 1N.slmd



Material Name	Color	Unit Weight (lbs/ ft3)	Cohesion (psf)	Phi (deg)
Bedrock	▦	150		
Poz-o-Pac	⬛	125	0	32
Existing Soils - Sand with Gravel	🟫	108.6	0	30
Concrete	⬜	150		
Pond Pool	🟦	62.4		
Backfill Materials	🟥	120	300	0
Weathered Bedrock	▨	150	0	35
Access Road Sand and Gravel	🟩	100	0	30

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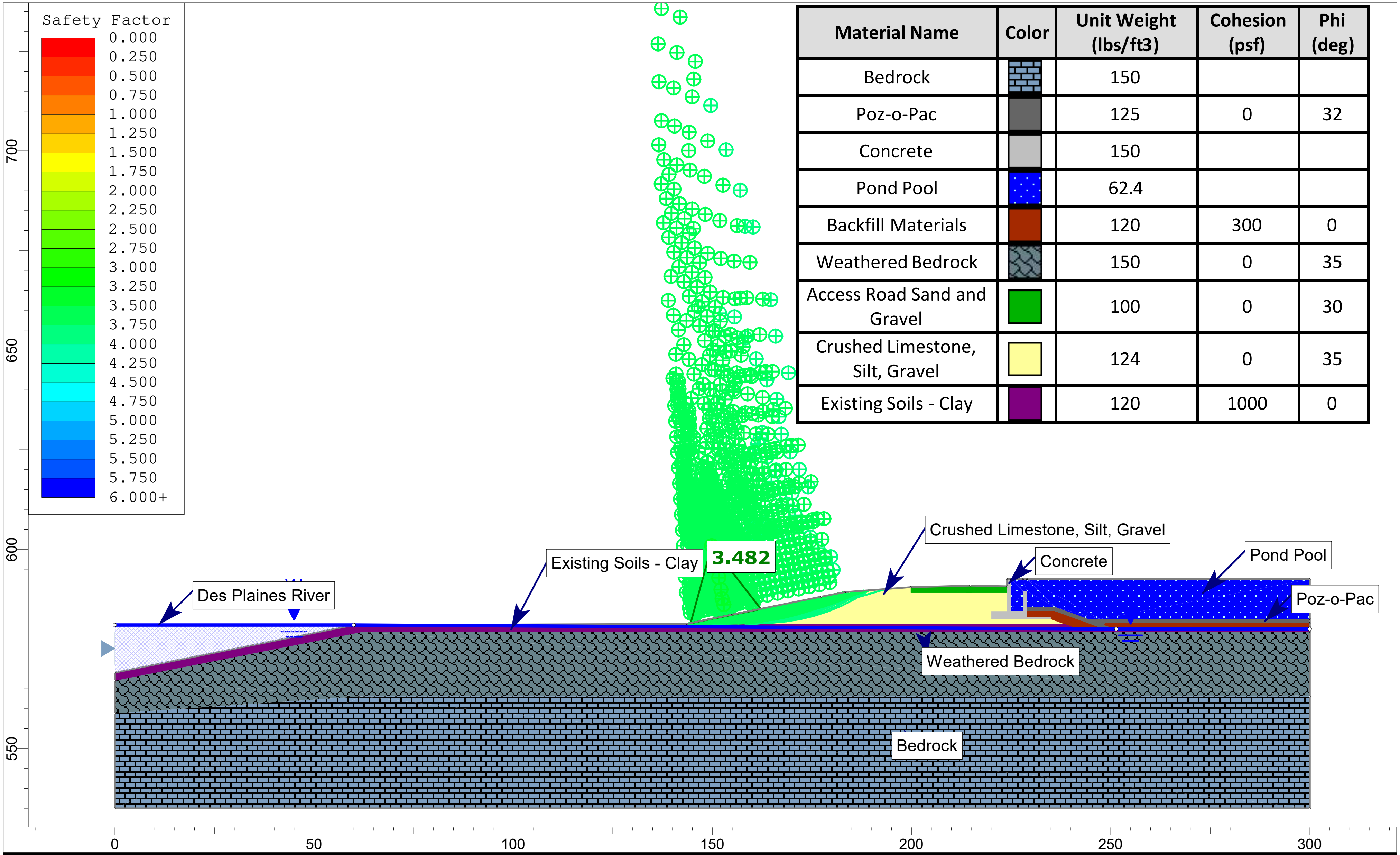
Figure 10: Pond 2S Slope Stability Analysis

Analysis	Spencer	*Scale:*	1:400	*Scenario*	Pond 2S, Long-Term, Maximum Storage Pool - Seismic		
Drawn By	CAC	*Checked By:*	MDB	*Approved By:*	MDJ	*Company*	Civil & Environmental Consultants, Inc.
Date	08/25/2021	*Date:*	9/23/2021	*Date:*	9/23/2021	*File Name*	312192-WC-Pond 1N.slmd



Material Name	Color	Unit Weight (lbs/ft3)	Cohesion (psf)	Phi (deg)
Bedrock	▦	150		
Poz-o-Pac	⬛	125	0	32
Concrete	⬜	150		
Pond Pool	🟦	62.4		
Backfill Materials	🟫	120	300	0
Weathered Bedrock	▨	150	0	35
Access Road Sand and Gravel	🟩	100	0	30
Crushed Limestone, Silt, Gravel	🟨	124	0	35
Existing Soils - Clay	🟪	120	1000	0

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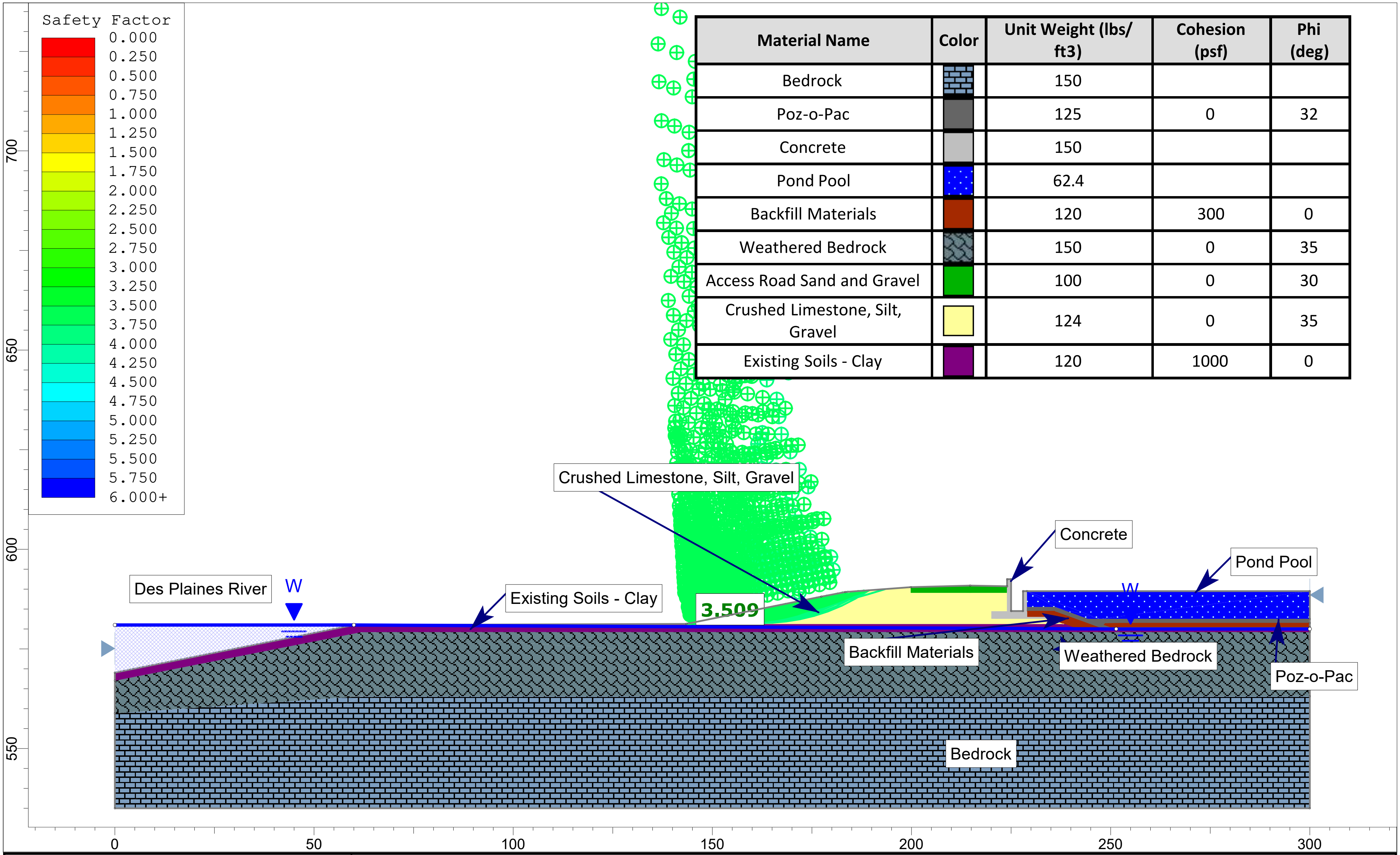
Figure 11: Pond 3S Slope Stability Analysis

Analysis	Spencer	*Scale:*	1:400	*Scenario*	Pond 3S, Long-Term, Maximum Surcharge Pool		
Drawn By	CAC	*Checked By:*	MDB	*Approved By:*	MDJ	*Company*	Civil & Environmental Consultants, Inc.
Date	08/25/2021	*Date:*	9/23/2021	*Date:*	9/23/2021	*File Name*	312192-WC-Pond 1N.slmd



Material Name	Color	Unit Weight (lbs/ ft3)	Cohesion (psf)	Phi (deg)
Bedrock	▦	150		
Poz-o-Pac	⬛	125	0	32
Concrete	⬜	150		
Pond Pool	🟦	62.4		
Backfill Materials	🟥	120	300	0
Weathered Bedrock	▨	150	0	35
Access Road Sand and Gravel	🟩	100	0	30
Crushed Limestone, Silt, Gravel	🟨	124	0	35
Existing Soils - Clay	🟪	120	1000	0

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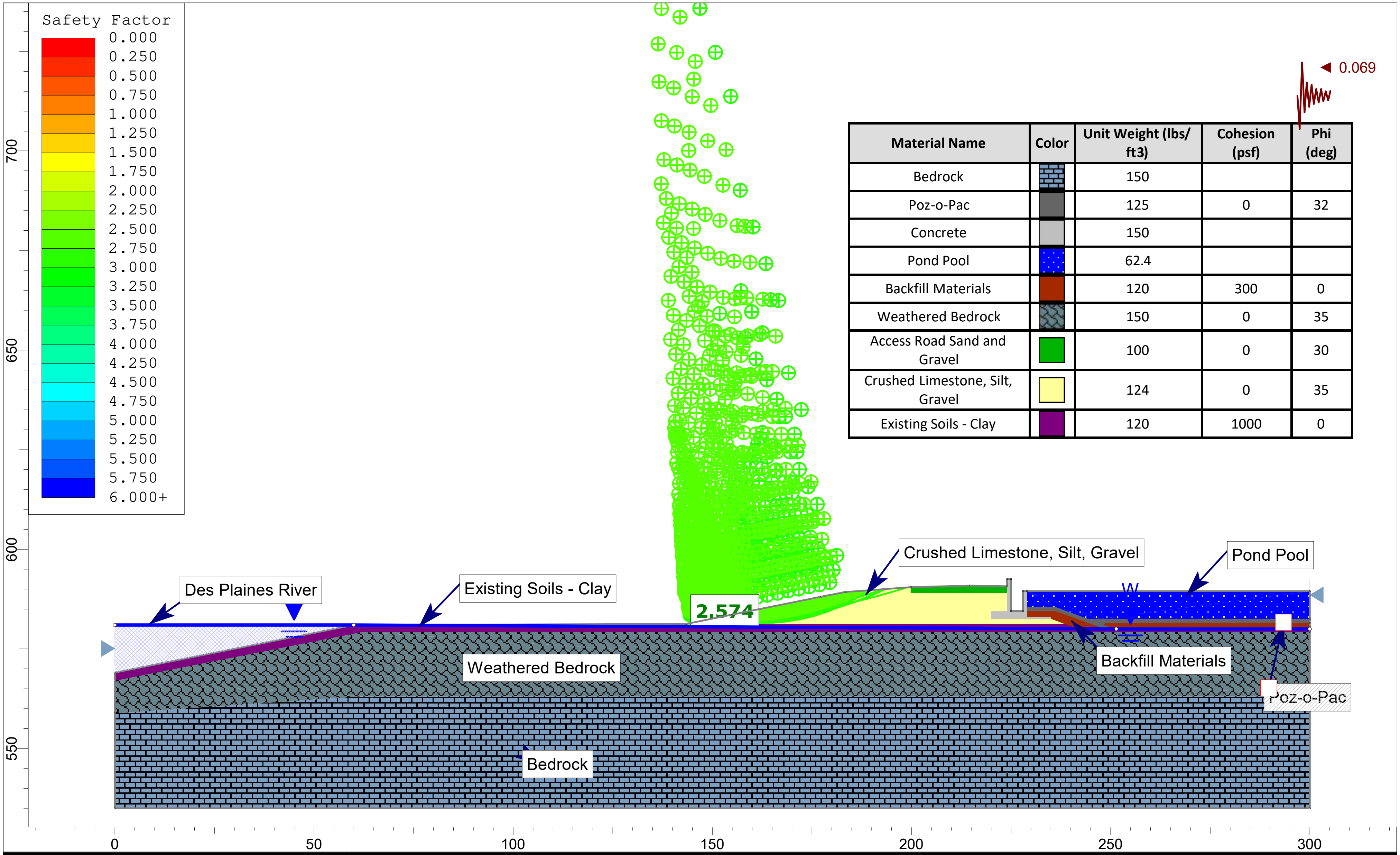
Project	**Figure 12: Pond 3S Slope Stability Analysis**				
Analysis	Spencer	*Scale:*	1:400	*Scenario*	Pond 3S, Long-Term, Maximum Storage Pool
Drawn By CAC	*Checked By:* MDB	*Approved By:* MDJ		*Company*	Civil & Environmental Consultants, Inc.
Date 08/25/2021	*Date:* 9/23/2021	*Date:* 9/23/2021		*File Name*	312192-WC-Pond 1N.slmd



Material Name	Color	Unit Weight (lbs/ ft3)	Cohesion (psf)	Phi (deg)
Bedrock	▦	150		
Poz-o-Pac	⬛	125	0	32
Concrete	⬜	150		
Pond Pool	🟦	62.4		
Backfill Materials	🟫	120	300	0
Weathered Bedrock	▨	150	0	35
Access Road Sand and Gravel	🟩	100	0	30
Crushed Limestone, Silt, Gravel	🟨	124	0	35
Existing Soils - Clay	🟪	120	1000	0

CEC
Civil & Environmental Consultants, Inc.

SLIDEINTERPRET 9.009

Project

Figure 13: Pond 3S Slope Stability Analysis

Analysis Spencer		*Scale:* 1:400		*Scenario* Pond 3S, Long-Term, Maximum Storage Pool - Seismic	
Drawn By CAC	*Checked By:* MDB	*Approved By:* MDJ		*Company* Civil & Environmental Consultants, Inc.	
Date 08/25/2021	*Date:* 9/23/2021	*Date:* 9/23/2021		*File Name* 312192-WC-Pond 1N.slmd	

MWG
Midwest Generation, LLC

WILL COUNTY GENERATING STATION

SPECIFICATION W-9101

CONSTRUCTION QUALITY ASSURANCE FOR CLOSURE OF PONDS 1N, 1S, 2S, AND 3S

S&L PROJECT NO.: 12661-153

REVISION 0

ISSUE PURPOSE: PERMIT

ISSUE DATE: 07-28-2023

Sargent & Lundy

SECTION 000106

ISSUE SUMMARY AND APPROVAL PAGE

Rev.	Purpose of Issue	Date	Sections Affected
0	Permit	07-28-2023	All

This is to confirm that this Specification has been prepared, reviewed, and approved in accordance with Sargent & Lundy's Standard Operating Procedure SOP-0407, Specifications, which is part of our Quality Management System.

Contributor Summary & Current Revision Signatures

Rev.	Prepared By	Reviewed By	Approved By
0	A. Sahlas	T. Dehlin	T. Dehlin

SECTION 000107

CERTIFICATION PAGE

Sargent & Lundy, L.L.C. (S&L) is registered in the State of Illinois to practice engineering. S&L's Illinois Department of Financial and Professional Regulation registration number is 184-000106.

I certify that this Specification was prepared by me or under my direct supervision and that I am a registered professional engineer under the laws of the State of Illinois.

Certified By: Thomas J. Dehlin

Date: July 28, 2023

Seal:

THOMAS J. DEHLIN
062-069314

SECTION 000110

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DIVISION 00 – PROCUREMENT AND CONTRACTING

DIVISION 01 - GENERAL REQUIREMENTS

END OF SECTION 000110

SECTION 011100

SUMMARY OF WORK

PART 1 - GENERAL

101. PROJECT INFORMATION

101.1 Owner: Midwest Generation, LLC (MWG)

101.2 Design Engineer: Sargent & Lundy (S&L)

101.3 Project Name: Construction Quality Assurance for Closure of Ponds 1N, 1S, 2S, and 3S

101.4 Project Location: Will County Generating Station
529 E. Romeo Rd.
Romeoville, IL 60446

102. DESCRIPTION OF THE PROJECT AND GENERAL BACKGROUND

102.1 The purpose of this project is to close Ponds 1N, 1S, 2S, and 3S at Midwest Generation, LLC's Will County Generating Station in accordance with the Illinois Pollution Control Board's Coal Combustion Residuals (CCR) Rule, 35 Ill. Adm. Code Part 845, and to close Ponds 2S and 3S in accordance with the U.S. Environmental Protection Agency's (EPA) CCR Rule, 40 CFR Part 257 Subpart D.

102.2 Ponds 1N, 1S, 2S, and 3S will be closed by leaving CCR and CCR-mixed materials stored in the ponds in-place and installing a final cover system over each pond.

103. SCOPE OF WORK

103.1 In general, this Specification covers the field and laboratory activities for a Construction Quality Assurance (CQA) Contractor to provide assurance and documentation that Ponds 1N, 1S, 2S, and 3S are closed in accordance with the General Work (GW) Specification (W-9100), the Design Drawings, and permit requirements.

103.2 The CQA Work shall include but not be limited to, the following activities:

a. Prepare a CQA Plan that provides a detailed description of the activities that will be performed by the CQA Contractor in accordance with the Design Drawings and this Specification.

b. Verify all appropriate measures are taken by the GW Contractor to protect the ponds' existing liner systems from damage during closure activities.

c. Perform earthwork inspection and testing work specified in Section 014362 to:

c1. Verify compliance of materials with the GW Specification and Design Drawings.

c2. Perform field material and installation tests.

c3. Obtain samples and perform laboratory tests and/or contract an independent, third-party testing laboratory to have laboratory tests performed and audit laboratory test results.

c4. Perform inspections during construction.

d. Perform geosynthetics inspection and testing work specified in Section 014362 to:

d1. Verify compliance of materials with the GW Specification and Design Drawings.

d2. Perform field material and installation tests.

d3. Obtain samples and perform laboratory tests and/or contract an independent, third-party testing laboratory to have laboratory tests performed and audit laboratory test results.

d4. Witness field testing and audit field test results.

d5. Perform inspections during construction.

e. Identify non-conforming work.

f. Meetings, Documentation, and Reports:

f1. Participate in project meetings.

f2. Prepare CQA records and documents.

f3. Prepare CQA reports, including:

f3.1 Preparing an Index Report listing all CQA reports prepared throughout the project.

f3.2 Preparing and certifying Weekly Summary Reports until the end of the project.

f3.3 Preparing and certifying a Final Report at the end of the project.

103.3 The CQA Work shall conform to the requirements of this Specification and shall be performed and supervised by personnel who are experienced and knowledgeable in the crafts and trades required by the Scope of Work. The CQA Work shall be performed exclusively by the CQA Contractor's trained and competent personnel or, where permitted, that of its subcontractor(s); and shall comply with all applicable safety laws, regulations, programs, and practices to ensure the safety of those located on the work site and associated laboratories, including the CQA Contractor's personnel (or that of its subcontractor(s)) performing the CQA Work.

103.4 Performance of the CQA Work shall include all the labor, supervision, administration, management, tools, testing equipment, and consumables to execute the CQA Work identified herein.

103.5 Inspection and tests specified in this Specification shall be performed by personnel qualified to perform such inspections and tests.

104. RESPONSIBILITY AND AUTHORITY

104.1 The responsibilities and authority are described below for the organizations that will be involved in the design, permitting, and construction activities associated with the project.

a. Permitting Authority:

a1. The Illinois EPA is the Permitting Authority and is responsible for reviewing the permit applications for closing Ponds 1N, 1S, 2S, and 3S to assure compliance with state regulations and for granting permits for the project.

a2. The Permitting Authority may review any design revisions during construction and any requests for variance submitted by the Owner. The Permitting Authority has the authority to review and approve all CQA documentation and reports and to confirm Ponds 1N, 1S, 2S, and 3S were closed as specified in Project Specifications and the Design Drawings.

b. Owner:

b1. MWG is the Owner of the facility and has the authority to accept or reject materials and workmanship of the GW Contractor or reports and recommendations of the CQA Contractor.

b2. The Owner will ultimately be responsible for the closure construction for Ponds 1N, 1S, 2S, and 3S and for assuring the Permitting Authority that the construction meets or exceeds the requirements specified in state regulations, permits, Project Specifications, and the Design Drawings. The Owner will accomplish this by retaining a CQA Contractor for the project.

c. Design Engineer:

c1. S&L is the Design Engineer and is responsible for designing the closure features for Ponds 1N, 1S, 2S, and 3S.

c2. The Design Engineer will assure that the closure design meets or exceeds the construction requirements of the Owner and meets or exceeds the requirements of the Permitting Authority.

c3. The Design Engineer shall resolve unexpected conditions or unanticipated problems during construction, which may require changes to the permitted design. Changes to the permitted design shall require approval of the Owner and Design Engineer to ensure that the original design objectives are still maintained. All changes shall meet state regulatory requirements and the rules promulgated thereunder and may include Permitting Authority-approved variances to the rules.

d. GW Contractor:

d1. The GW Contractor shall be responsible for constructing the facility in accordance with the GW Specification (W-9100) and the Design Drawings and shall implement additional quality control and quality assurance procedures and techniques as necessary during construction.

d2. The GW Contractor will consist of an Earthwork Contractor performing the earthwork and a Geosynthetics Contractor installing the geosynthetic materials for the ponds' final cover systems. The GW Contractor may self-perform or subcontract the duties of the Earthwork Contractor and/or Geosynthetics Contractor.

e. CQA Contractor:

e1. The CQA Contractor shall be the company employed by the Owner who is responsible for performing the CQA Work. The CQA Contractor shall be objective, competent, and independent from the GW Contractor whose work is being inspected. The CQA Contractor shall remain independent throughout the duration of the project.

e2. The CQA Contractor's team shall include the CQA Officer and two or more CQA Inspectors.

f. CQA Officer:

f1. The CQA Officer shall be a professional engineer licensed in the State of Illinois who shall be responsible for implementation of the CQA Work. The CQA Officer shall be responsible to the Owner.

f2. The CQA Officer shall be responsible for the performance of activities specified herein such as auditing, inspecting, sampling, testing, documenting, and for preparing and certifying the Final Report. In addition, the CQA Officer and/or its inspectors shall have the responsibility of daily coordination with CQA Inspectors, the GW Contractor and its subcontractors, and the Owner to discuss daily progress, review completed work, perform visual inspections, review test results, and discuss and assist in resolving any current or potential construction problems.

f3. Except as provided by Paragraph 104.1f4, the CQA Officer shall be present to provide supervision and assume responsibility for performing all inspections of the following activities, when applicable:

f3.1 Compaction of subgrade materials.

f3.2 Installation of the final cover system, including installation of the geomembrane cover.

f4. If the CQA Officer is unable to be present as required by Paragraph 104.1f3, the CQA Officer shall provide the following in writing:

f4.1 The reasons for the CQA Officer's absence.

f4.2 A designation of a person who must exercise professional judgment in carrying out the duties of the CQA Officer-in-Absentia.

f4.3 A signed statement that the CQA Officer assumes full responsibility for all inspections performed and reports prepared by the designated CQA Officer-in-Absentia during the absence of the CQA Officer.

g. CQA Inspectors:

g1. The CQA Inspectors shall be responsible for performing visual examinations and for performing or obtaining field and laboratory tests. The CQA Inspectors shall be under the direct supervision of the CQA Officer.

g2. The CQA Inspectors shall be responsible for reporting to the CQA Officer and the Owner's representative the results of any inspections or tests indicating materials or installed work are of unacceptable quality or do not meet specified design requirements.

g3. Throughout the project, at least one CQA inspector for earthwork (CQA Earthwork Inspector) and at least one CQA inspector for geosynthetics work (CQA Geosynthetics Inspector), each with specialized knowledge and training, shall be present at the site. However, each inspector only needs to be present at the project site if the GW Contractor is conducting work associated with their scope of responsibility (e.g., the CQA Geosynthetics Inspector only needs to be present when the Geosynthetics Contractor is performing work).

105. QUALIFICATIONS

105.1 CQA Officer:

a. The CQA Officer shall be a registered professional engineer in the State of Illinois with at least 10 years of experience in design/construction/permitting/licensing, at least 5 years of which is CQA experience as a certifying engineer on landfills or ponds with geomembrane liner systems.

b. The CQA Officer shall be qualified by education, technical knowledge, and experience to complete the technical certifications required by this Specification.

105.2 CQA Inspectors:

a. The CQA Inspectors shall have adequate formal academic training and sufficient practical and technical experience needed to execute and record auditing and inspection activities conducted at the site and perform all required laboratory and field testing. This includes a demonstrated knowledge of the various aspects of the type of work being conducted.

b. As required, different CQA Inspectors, each with specialized knowledge and experience, shall be employed for different portions of the work.

c. CQA Earthwork Inspectors:

c1. The lead CQA field inspector for earthwork (Lead CQA Earthwork Inspector) shall have at least 5 years of experience as an earthwork inspector.

c2. All CQA Earthwork Inspectors shall be knowledgeable in:

c2.1 Field practices relating to construction techniques used for the type of earthwork being performed.

c2.2 Construction and compaction equipment.

c2.3 All codes and regulations concerning material installation.

c2.4 Observation procedures for earthwork construction.

c2.5 Sampling and earthwork testing procedures.

c2.6 Testing equipment.

c2.7 Documentation procedures.

c2.8 Site safety.

d. CQA Geosynthetics Inspectors:

d1. The lead CQA field inspector for geosynthetics (Lead CQA Geosynthetics Inspector) shall have at least 5 years of CQA experience as a field inspector on projects with a geomembrane lining system including two years as a CQA inspector.

d2. All CQA Geosynthetics Inspectors shall be knowledgeable in:

d2.1 Field practice relating to techniques used for the installation of high-density polyethylene (HDPE) geomembranes and geotextiles.

d2.2 HDPE geomembrane welding equipment and the correct operating procedures for seaming HDPE geomembranes, including but not limited to:

d2.2.1 Non-destructive seam testing procedures and failure criteria.

d2.2.2 Sampling for destructive testing of samples of seams and laboratory testing procedures.

d2.2.3 Laboratory testing equipment.

d2.3 Geotextile seaming equipment and the correct procedures for splicing geotextiles.

d2.4 All codes and regulations concerning material installation.

d2.5 Documentation procedures for field and laboratory tests.

d2.6 Site safety.

106. DEFINITIONS

106.1 The term "Design Drawing" means the Design Engineer's drawings indicating the Work to be performed.

106.2 The term "Work" means the services furnished to complete the CQA activities specified herein.

106.3 The term "Owner-approved equal" means an acceptable equivalent to a specified material or equipment that has been accepted by the Owner.

107. PROJECT MEETINGS

107.1 Project meetings will be held on a periodic basis during the lifetime of the project. The meetings will include:

a. A preconstruction meeting.

b. Progress meetings.

c. Additional meetings as required to discuss problems or work deficiencies.

107.2 Preconstruction Meeting:

a. The preconstruction meeting will be organized by the Owner. In addition to the Owner, the Design Engineer, the GW Contractor (including representatives of the Earthwork Contractor and Geosynthetics Contractor), the CQA Officer (or CQA Officer-in-Absentia), the Lead CQA Inspectors, and any other interested party designated by the Owner shall attend the preconstruction meeting.

b. The preconstruction meeting shall be used to discuss:

b1. Site specific safety requirements.

b2. Requirements of the Design Drawings, GW Specification, and CQA Specification.

b3. The CQA Contractor’s CQA Plan and the responsibilities of each party.

b4. The lines of authority and communication.

b5. Procedure for submittal of manufacturer QA/QC documents for audit.

b6. Procedures for examination of materials delivered to the site.

b7. Location of material storage area(s).

b8. Field and laboratory test requirements and sample sizes.

b9. Procedures for observance of field tests.

b10. Coordination between each contractor and the CQA Inspector to obtain timely field samples and tests.

b11. Procedure for handling construction deficiencies, repairs, and retesting.

b12. Work area security and safety protocol.

b13. Work days and work hours.

b14. Coordination with other contractors or trades.

b15. Site visits.

107.3 Weekly Progress Meetings:

a. Weekly progress meetings will be scheduled by the Owner. In addition to the Owner, the meetings shall be attended by the Design Engineer, the GW Contractor (including representatives of the Earthwork Contractor and the Geosynthetics Contractor), the CQA Officer (or CQA Officer-in-Absentia), and the Lead CQA Inspectors.

b. If needed, daily meetings shall be held each day to review the work schedule, work completed, results of tests, and to discuss potential construction problems.

c. The Owner or its designee will document each meeting and distribute copies of meeting minutes to all responsible parties.

107.4 Additional Meetings:

a. Additional meetings between one or more contractors, the Lead CQA Inspector(s), and the CQA Officer (or the CQA Officer-in-Absentia) shall be held immediately after a work deficiency is identified or a problem arises. These meetings shall be used to define and resolve the problem.

b. Any supervisor/superintendent can request such a meeting through their line of authority.

c. Possible solutions to the problem shall be discussed, and an acceptable solution shall be selected. This solution shall be implemented provided it does not conflict with or require a change to the Design Drawings, in which case the solution shall be submitted to the Design Engineer for review.

d. The Design Engineer shall resolve unexpected conditions or unanticipated problems during construction, which may require changes to the permitted design. Changes from the permitted design shall require approval by the Owner and Design Engineer to ensure that the original design objectives are maintained. All changes shall meet the requirements of the Permitting Authority and may include regulations approved by the Permitting Authority.

e. The CQA Contractor shall document each special meeting and distribute copies of minutes to all responsible parties.

108. PERFORMANCE AUDITS AND DOCUMENTATION

108.1 As a minimum, the CQA Officer shall conduct the following reviews and performance audits:

a. Full review and audit of results of preconstruction testing or GW Contractor’s material certificates used to qualify earthwork materials for construction use.

b. Full review and audit of manufacturer certificates that qualify geosynthetic materials and ballast infill materials for use in the final cover system (including geomembrane and synthetic turf).

c. Weekly audit of reports and test data sheets during and after construction of the earthwork until completion of work.

d. Weekly audit of reports and test data sheets during and after installation of geosynthetic materials and ballast infill materials (including geomembrane and synthetic turf) until completion of the work.

108.2 CQA documentation shall be well-documented and include at least the following:

a. Daily records, which shall include:

a1. Inspection data sheets.

a2. Data sheets listing the number and types of construction equipment used by the GW Contractor and construction equipment data.

a3. Problem identification reports and corrective action reports. Problem identification reports and corrective action reports shall include detailed descriptions of materials and/or workmanship that do not meet a specified design and shall be cross-referenced to specific inspection data sheets where the problem was identified and corrected.

b. Testing records, which shall include:

b1. Material shipping and manufacturer QA/QC data sheets.

b2. Data sheets describing field samples taken.

b3. Laboratory data sheets.

b4. Field test data sheets.

b5. Notes, charts, drawings, or sketches identifying the location and elevation of field tests, location of failures and repairs or retests, and where samples were obtained.

b6. Non-destructive test reports including location of failures, records of repairs, and results of retests.

c. Photographic records, which shall include:

c1. Digital photographs, each with a unique identifying number.

c2. Figure indicating the location from which each photograph was taken.

c3. Summary list giving the date and time of each photograph.

108.3 All records shall, at a minimum, bear the following:

a. Unique identifying sheet number.

b. The date.

c. Project name, project number, and location.

d. Descriptive remarks.

e. Data sheets for tests.

f. Written text descriptions for visual observations

g. Signature of the preparer of designated authority.

END OF SECTION 011100

SECTION 014362

CONSTRUCTION QUALITY ASSURANCE FOR CLOSING A CCR SURFACE IMPOUNDMENT

PART 1 – GENERAL

101. EXTENT

101.1 The intent of this section is to define the requirements for Construction Quality Assurance (CQA) activities to ensure that the quality of materials and installation procedures used to close Ponds 1N, 1S, 2S, and 3S are in accordance with the General Work (GW) Specification W-9100, Design Drawings, permit requirements, and as specified herein.

101.2 The Work specified within this Specification is the responsibility of the CQA Contractor and shall include, but not be limited to, the following items:

a. Attend project meetings and site visits as scheduled by the GW Contractor for coordination between the Owner, GW Contractor, subcontractors, and CQA Contractor.

b. Perform pre-construction material certification activities to ensure materials meet or exceed GW Specification requirements that include but are not limited to:

b1. Testing for suitability of material prior to use.

b2. Performing pre-construction audits of material certifications prior to material use.

c. Perform CQA activities during construction to ensure materials meet or exceed GW Specification requirements:

c1. Perform audits of material certifications.

c2. Perform field observations, inspections, and tests and review test results.

c3. Perform laboratory tests and review test results.

c4. Material sampling.

d. Documentation of all observations, samples, certifications, test results, and conformance of work to the GW Specification that will be submitted by the Owner to the Permitting Authority.

e. Preparation of an Index Report and Weekly Summary Reports.

f. After the GW Contractor complete closure construction activities at each ash pond, prepare a Final Report that demonstrates that the given ash pond was closed in conformance with the GW Specification and the Design Drawings. This report shall include all test data, observations, audits, material certificates, and any other relevant documentation.

g. Submit a draft version of each Final Report to the Owner and Design Engineer for their review and comment. Upon resolution of all comments, submit a final version of the Final Report, sealed and certified by the CQA Officer, to the Owner and Design Engineer.

102. RELATED WORK SPECIFIED IN OTHER SECTIONS AND SPECIFICATIONS

102.1 CQA Specification W-9101:

a. Section 011100 – Summary of Work

102.2 GW Specification W-9100:

a. Section 311522 – Engineered Synthetic Turf for Final Cover System

b. Section 312205 – Earthwork for CCR Surface Impoundment Closure

c. Section 319022 – High Density Polyethylene Geomembrane Liner for Final Cover System

103. REFERENCE DOCUMENTS

103.1 Standards, specifications, manuals, codes and other publications of nationally recognized organizations and associations are referenced herein.

103.2 References to these documents are to the latest issue date of each document, unless otherwise indicated, together with the latest additions, addenda, amendments, supplements, etc., thereto, in effect as of the date of Contract for the Work.

103.3 Abbreviations listed indicate the form used to identify the reference documents cited in this section.

103.4 ASTM – ASTM International:

a.	C136	Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
b.	D422	Standard Test Method for Particle-Size Analysis of Soils (Withdrawn 2016).
c.	D792	Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement.
d.	D1004	Standard Test Method for Tear Resistance (Graves Tear) of Plastic Film and Sheeting.
e.	D1505	Standard Test Method for Density of Plastics by the Density-Gradient Technique.
f.	D1556	Standard Test Method for Density and Unit Weight of Soil in Place by Sand-Cone Method.
g.	D1557	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 (2,700 kN-m/m^3)).
h.	D1603	Standard Test Method for Carbon Black Content in Olefin Plastics.
i.	D2167	Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
j.	D2216	Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass.
k.	D2256	Standard Test Method for Tensile Properties of Yarns by the Single-Strand Method.
l.	D2487	Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System).
m.	D2488	Standard Practice for Description and Identification of Soils (Visual-Manual Procedures).

n. D2974 Standard Test Methods for Determining the Water (Moisture) Content, Ash Content, and Organic Material of Peat and Other Organic Soils.

o. D4218 Standard Test Method for Determination of Carbon Black Content in Polyethylene Compounds by the Muffle-Furnace Technique.

p. D4253 Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table.

q. D4254 Standard Test Methods for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density.

r. D4318 Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

s. D4643 Standard Test Method for Determination of Water Content of Soil and Rock by Microwave Oven Heating.

t. D4595 Standard Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method.

u. D4833 Standard Test Method for Index Puncture Resistance of Geomembranes and Related Products

v. D4959 Standard Test Method for Determination of Water Content of Soil By Direct Heating.

w. D5596 Standard Test Method for Microscopic Evaluation of the Dispersion of Carbon Black in Polyolefin Geosynthetics.

x. D5994 Standard Test Method for Measuring Core Thickness of Textured Geomembranes.

y. D5199 Standard Test Method for Measuring the Nominal Thickness of Geosynthetics.

z. D6241 Standard Test Method for Static Puncture Strength of Geotextiles and Geotextile-Related Products Using a 50-mm Probe.

aa. D6693 Standard Test Method for Determining Tensile Properties of Nonreinforced Polyethylene and Nonreinforced Flexible Polypropylene Geomembranes.

bb. D6938 Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

104. SUBMITTALS

104.1 Submittals with Bid Proposal:

a. Documentation to substantiate that the CQA Contractor’s and its laboratory’s Accreditation Certifications are current.

b. Detailed resumes on all CQA laboratory and field personnel proposed for the Work, including a complete description of their qualifications and previous experience in the same type of work and documentation of certification to perform required testing.

104.2 Submittals During the Course of the Work:

a. Certifications and submittals as specified herein.

b. An Index Report, Weekly Summary Reports, and a Final Report as described below shall be prepared for each pond being closed (*i.e.*, one set of reports per ash pond).

b1. Index Report:

b1.1 An Index Report shall be prepared listing all records and reports.

b1.2 The Index Report shall be assembled in chronological framework for recording and identifying all reports.

b2. Weekly Summary Report:

b2.1 At the end of each week of construction, until construction is complete, a Weekly Summary Report must be prepared by either the CQA Officer or under the supervision of the CQA Officer and submitted to the Owner and the Design Engineer. The CQA Officer must review and approve the Weekly Summary Report.

b2.2 The Weekly Summary Report shall contain descriptions of the weather, locations where construction occurred during the previous week, materials used, results of testing, inspection reports, and procedures used to perform the inspections.

b3. Final Report:

b3.1 After the GW Contractor complete closure activities at an ash pond, the CQA Officer shall prepare a Final Report for the earthwork and the installation of the geosynthetic materials. Each Final Report shall contain documentation that closure construction proceeded in accordance with the Design Drawings, Project Specifications, and permit requirements. At a minimum, each report shall include:

b3.1.1 All data sheets, testing records, manufacturer data sheets, and reports concerning items that were installed and tested.

b3.1.2 Photographs of the final cover system and any other photographs relied upon to document construction activities. All photographs shall include time, date, and location information.

b3.1.3 Any designations of CQA officers-in-absentia in accordance with Section 011100, Paragraph 104.1f4.

b3.1.4 Certification that the GW Contractor's work is in compliance with Project Specifications, the Design Drawings, and permit requirements.

b3.1.5 Certifications that:

b.3.1.5.1 All bedding material contains no undesirable objects.

b.3.1.5.2 The final closure plan approved by the construction permit issued by the Illinois Environmental Protection Agency has been followed.

b.3.1.5.3 All anchor trenches and backfill were constructed to prevent damage to the geomembrane.

b.3.1.5.4 All tears, rips, punctures, and other damage have been repaired.

b.3.1.5.5 All geomembrane seams have been properly constructed and tested in accordance with the manufacturer's specifications.

b.3.1.5.6 The CCR material in the pond was appropriately stabilized prior to placement of Structural Fill and/or final cover system materials.

b3.2 The first draft of each Final Report shall be submitted to the Owner and Design Engineer for their review and comment within one week after completion of CQA Work.

b3.3 Within one week of resolving all comments, the final version of each Final Report shall be sealed and certified by the CQA Officer and submitted to the Owner and Design Engineer.

105. <u>CONSTRUCTION QUALITY ASSURANCE REQUIREMENTS</u>

105.1 Organizations Involved:

a. The organizations involved in the design, permitting, and construction activities associated with the project are defined in Section 011100.

b. The responsibilities and authority of the organizations and personnel associated with the project are defined in Section 011100.

105.2 Qualifications:

a. The qualifications of the CQA Contractor personnel are described in Section 011100.

105.3 Project Meetings and Audits:

a. The requirements for project meetings and audits are described in Section 011100.

105.4 Performance Audits, CQA Documentation, and CQA Reports:

a. The requirements for performance audits and CQA documentation are described in Section 011100.

b. The requirements for CQA reports are described in Paragraph 104.2 of this section.

PART 2 – PRODUCTS

201. <u>PRODUCTS</u>

201.1 The requirements for the various products used for closing Ponds 1N, 1S, 2S, and 3S are specified in their respective technical specification sections in the GW Specification.

201.2 All permanent materials to be used for closing Ponds 1N, 1S, 2S, and 3S will be supplied by the GW Contractor. The CQA Contractor shall coordinate with the GW Contractor on obtaining material certifications and samples for performing the audits and tests required by this Specification.

PART 3 – EXECUTION

301. GENERAL CQA TESTING AND INSPECTION REQUIREMENTS

301.1 Record daily atmospheric conditions.

301.2 Field tests shall document the elevation and coordinate location for each test. The locations may be determined by survey, taping, pacing off distances, or hand-held GPS receiver provided the receiver indicates an error of 20 ft or less at the time the coordinates are recorded. All locations should be reported in appropriate significant figures. Locations of seams, damage to geosynthetics, and repairs to geosynthetics shall be obtained through quality survey methodologies.

301.3 Material Source Testing: Material source testing activities include visual observations and laboratory and field testing at the material source to control material quality and material preparation prior to transport of the material to the facility.

302. CQA TESTING AND INSPECTION REQUIREMENTS FOR SUBGRADE (CCR) TO RECEIVE STRUCTURAL FILL OR GEOMEMBRANE

302.1 Inspections and Testing During Construction:

a. CQA activities during subgrade preparation work shall include visual observations and field testing to ensure that subgrade (CCR) preparation for Structural Fill is in accordance with GW Specification requirements. Field observations and tests shall be performed in accordance with the requirements specified in Table 014362-1 and the following paragraphs.

b. Visual Observations:

b1. Record type and size of compaction equipment in use:

b1.1 For rubber-tired rollers, record the tire inflation pressure, spacing of tires, and empty and ballasted wheel loads.

b1.2 For vibratory rollers, record the static weight, imparted dynamic force, operating frequency of vibration, and drum diameter and length.

b1.3 For hand tampers, record make, model number, size and compactive effort.

b2. Observe and record compactive effort, uniformity of compaction and scarification and connection between compacted lifts. Record number of passes of a roller by type, size, and weight of roller.

b3. For proofrolling, record the type, size, and weight of compaction equipment or other vehicles used for proofrolling.

b4. Observe removal of all organic and undesirable material.

b5. Observe that there are no moisture seeps, puddling, or ponding.

b6. Observe proofrolling to identify soft spots, and observe removal of material in soft spots.

b7. Observe compaction of the subgrade prior to placement of the proceeding layer of material. For areas of the subgrade on which the geomembrane component of the final cover system will be directly placed, inspect for any large, protruding, or sharp material that could puncture a geomembrane.

b8. Verify measurements and determine that the depth and slope of all excavations meet design requirements and that there are no slope failures from moisture seeps or other causes.

c. Laboratory and Field Tests:

c1. Laboratory testing and field testing for subgrade shall be performed in accordance with the requirements specified in Table 014362-1.

d. Test Acceptance Criteria:

d1. Acceptance criteria for subgrade approval shall be as specified in GW Specification Section 312205.

303. CQA TESTING AND INSPECTION REQUIREMENTS FOR STRUCTURAL FILL MATERIAL

303.1 Initial Material Certification:

a. Prior to shipment of any Structural Fill material, the CQA Contractor shall assemble, document the receipt of, and audit the material supplier's test results and certifications that the properties of the material meet GW Specification requirements.

303.2 Inspections and Testing During Construction:

a. CQA activities during placement of Structural Fill shall include visual observations and laboratory and field testing to ensure that Structural Fill is installed in accordance with GW Specification requirements. Field observations and tests shall be performed in accordance with the requirements specified in Table 014362-2 and the following paragraphs.

b. Visual Observation of the Material Source for Structural Fill Material During Construction:

b1. Inspect materials to ensure that they are uniform.

b2. Visually inspect the material in accordance with ASTM D2488.

b3. Inspect to ensure that only suitable material is transported to the site, observe segregation operations if unsuitable materials are present, and observe (if necessary) the removal of organic soils, roots, stumps, and stones.

b4. Observe changes in color or texture that can be indicative of a change in material type or moisture content.

b5. Observe moisture conditioning activities to ensure that any required substantial changes in moisture content are made at the source.

c. Visual Observation of Fill Placement:

c1. Record type and size of compaction equipment in use:

c1.1 For rubber-tired rollers, record the tire inflation pressure, spacing of tires, and empty and ballasted wheel loads.

c1.2 For vibratory rollers, record the static weight, imparted dynamic force, operating frequency of vibration, and drum diameter and length.

c1.3 For hand tampers, record make, model number, size and compactive effort.

c1.4 Observe and record compactive effort, uniformity of compaction and scarification and connection between compacted lifts. Record number of passes of a roller by type, size, and weight of roller.

c1.5 For proofrolling, record the type, size, and weight of compaction equipment or other vehicles used for proofrolling.

c2. Observe removal of roots, rocks, rubbish, or out-of-specification soil from the borrow material.

c3. Observe and record changes in soil characteristics necessitating a change in construction procedures.

c4. Observe fill placement and procedures for proper fill thickness.

c5. Observe procedures to be followed to adjust the soil moisture content to obtain uniform moisture content.

c6. Observe and record final finishing procedures.

c7. Observe and record that final grade is consistent with the design grade specified on the Design Drawings.

c8. Observe that there is proper placement and compaction of any backfill around recessed areas, pipes, or sumps.

d. Laboratory and Field Tests:

d1. Laboratory and field testing shall be performed in accordance with the requirements specified in Table 014362-2.

e. Test Acceptance Criteria:

e1. Acceptance criteria shall be as specified in GW Specification Section 312205.

304. <u>CQA TESTING AND INSPECTION REQUIREMENTS FOR GEOMEMBRANE COMPONENT OF FINAL COVER SYSTEM</u>

304.1 Initial Material Certification and Inspection of Installation Plans:

a. Prior to shipment of any geomembrane materials, the CQA Contractor shall assemble, document the receipt of, and audit the Geomembrane Manufacturer submittals listed below for conformance with the GW Specification.

a1. Geomembrane Resin:

a1.1 Certificate that the resin meets GW Specification requirements.

a1.2 Certificate of the origin of the resin and that all resin is from the same supplier (including resin supplier’s name, identification brand name and number).

a1.3 Copies of the Geomembrane Manufacturer’s QA/QC certificates and resin supplier’s QA/QC certificates. Certificates shall include a summary report of test results conducted to verify the quality of the resin used in each batch to manufacture geomembrane for this project. As a minimum, the report shall include tests on specific gravity, melt flow index and percent carbon black.

a2. Geomembrane Sheeting:

a2.1 Certification that the properties of the manufactured sheeting meet GW Specification requirements and are guaranteed by the Geomembrane Manufacturer.

a2.2 Statement certifying that no post consumer resin (PCR) has been added to the formulation. Note: Polymer recycled during the manufacturing process may be permitted provided that it does not exceed 10% by weight.

a2.3 Statement certifying that the manufactured sheeting is free of per- and polyfluoroalkyl substances (PFAS).

a2.4 Copies of all of the Geomembrane Manufacturer's QA/QC certificates for the geomembrane sheeting. The certificates shall include test results.

a3. Extrudate Resins or Rod for Seaming Geomembrane:

a3.1 Certification from the Geomembrane Manufacturer that all extrudate is the same resin type as the geomembrane and was obtained from the same resin supplier as the resin used to manufacture the geomembrane.

b. Review of GW Contractor’s Installation Plans:

b1. Geomembrane Field Installation Quality Control (QC) Plan:

b1.1 Document receipt of the GW Contractor’s QC plan for installing geomembrane.

b1.2 Review the plan for compliance with the GW Specification and document where the plan is not in compliance.

b2. Geomembrane Panel Layout:

b2.1 Document receipt of the GW Contractor’s panel layout for geomembrane.

304.2 Transportation, Handling, and Storage:

a. Documentation of Delivery:

a1. Document arrival of rolls of geomembrane.

a2. Document that each roll is marked with the following information:

a2.1 Name of Geomembrane Manufacturer.

a2.2 Product identification (e.g., brand name, product code), which can be traced back to the origin of the base material (resin supplier’s name, resin production plant, resin brand name type, resin brand number, and production date of the resin).

a2.3 Date of manufacture.

a2.4 Roll identification number.

a2.5 Geomembrane thickness and type.

a2.6 Roll dimensions (i.e., length and width) and weight.

a2.7 Manufacturing lot number.

a2.8 Order number.

a2.9 Panel number, which shall be referenced to the proposed HDPE geomembrane liner panel layout drawing prepared by the Geomembrane Manufacturer.

a3. Check the Quality Control certificates on each roll to verify that the rolls received onsite meet the GW Specification. Take the identifying labels from each roll or pallet and save them for future reference.

a4. Recommend rejection of rolls which do not have the required documentation and ensure that the rolls are removed from the site.

b. Inspection of Manufactured Rolls:

b1. Inspect all manufactured rolls upon delivery to the site.

b2. Ensure that packaging is secure and that no damage has occurred.

b3. If damage to packaging has occurred, inspect exposed roll surfaces, and note and identify any damage or repairable flaws. Note: This visual observation shall be conducted without unrolling rolls unless the extent of surface damage indicates that internal damage may be present.

b4. If damage to just the packaging has occurred, document repair of the packaging.

b5. If damage to the product has occurred, document that the damage or flaws are repaired or that the damaged material is wasted and removed from the site.

b6. Report all damage to the Owner.

c. Handling:

c1. Inspect the onsite handling equipment being used to move materials to ensure that it is adequate to minimize the risk of damage to materials.

c2. Inspect the handling of materials by installing personnel to ensure that care is used.

d. Storage:

d1. Inspect the storage facility.

d2. Inspect the ground surface to ensure that it is dry, relatively level, smooth and free of rocks, holes, and debris.

d3. Document unsafe or improper storage conditions, and report conditions to the Owner.

304.3 Preconstruction Testing:

a. Prior to material shipment to the site, the Geomembrane Manufacturer shall submit to the CQA Contractor representative samples of the geomembrane to be shipped to the site, along with chain of custody and certification that the samples submitted are from the geomembrane material to be delivered to the site. The CQA Geosynthetics Inspector shall perform conformance testing of the received geomembrane samples in accordance with Table 014362-5. The laboratory tests shall be performed at least at the corresponding minimum frequencies specified in Table 014362-5.

b. Test acceptance criteria shall be as specified in GW Specification Section 319022. If the results from any of the tests in Table 014362-5 do not meet the respective pass/fail thresholds, then the CQA Officer shall reject all geomembrane material from the resin batch corresponding to the failed test(s) for use in the project.

304.4 Inspections and Testing During Construction:

a. CQA activities during placement of the geomembrane component of the ClosureTurf® final cover system shall include visual observations and field testing to ensure that the geomembrane cover is installed in accordance with GW Specification requirements. Field observations and tests shall be performed in accordance with the requirements specified in Table 014362-5 and the following paragraphs.

b. Weather Conditions for Placement:

b1. Observe and document the weather conditions (i.e., temperature, humidity, precipitation, and wind) to ensure that they are acceptable for geosynthetic material placement and seaming. The GW Specification describes acceptable weather conditions.

b2. If the weather becomes unacceptable for installation of the geomembrane cover, recommend stopping the installation until conditions again become favorable, thus minimizing the potential for unacceptable installation.

c. Geomembrane Placement:

c1. Prior to placement of the geomembrane cover, visually inspect the surface to be covered to ensure that it meets the requirements of the GW Specification. Confirm that it is compacted, free from clods of soil, rocks larger than specified, roots, sudden or sharp changes in grade and standing water. Field observations shall be performed in accordance with the requirements specified in Table 014362-3.

c2. Provide documentation of daily inspection of the surface to be covered for the area of geomembrane to be placed that day.

c3. Observe and document that the GW Contractor’s geomembrane placement plan is being followed. Note where the plan is not being followed and document the GW Contractor’s reasons for not following the plan. As each panel is placed, visually inspect the geomembrane for tears, punctures, and thin spots. The CQA Geosynthetics Inspector shall traverse the panels in such a way that the entire surface is inspected. Any defects shall be documented on a drawing and marked on the geomembrane for repair.

c4. Document that the locations of geomembrane seams meet the general requirements for seaming contained in GW Specification Section 319022.

c5. At the time of placement, make measurements to confirm that required overlap of adjacent geomembrane sheets has been achieved, that proper temporary anchorage is being used (e.g., sand bags or tires), and that the geomembrane is being placed in a relaxed (nonstressed) state.

c6. Document any liner damage from adverse weather conditions, equipment, inadequate temporary anchoring, or rough handling. Mark the location of damage on the geomembrane for repair and on a drawing.

c7. Document improper liner placement (e.g., if the GW Contractor’s placement plan is not followed) and, as a result, inadequate coverage with the available materials or an excess number of field seams.

c8. Document inadequate sheet overlap resulting in poor quality seams.

c9. Document nonwelded or cut panels.

c10. Document repair of damage. Documentation shall include location, type, and method of repair.

d. Geomembrane Seaming and Seam Repair:

d1. Trial Welds Prior to Beginning Seaming:

d1.1 Observe that trial welds are being made at the frequency specified in GW Specification Section 319022.

d1.2 Observe fabrication of test strips and note that test strips are fabricated correctly.

d1.3 Specify where samples are to be cut from the test strips and witness all destructive tests.

d1.4 Observe documentation of results of the destructive tests by the GW Contractor.

d1.5 Audit documentation of each trial weld received from the GW Contractor.

d2. Seaming and Seam Repair: Activities that shall be documented during field seaming operations include:

d2.1 Observe that the geomembrane is free from dirt, dust, and moisture.

d2.2 Observe that the seaming materials and seam welding equipment are as specified.

d2.3 Observe that a firm foundation is available for seaming.

d2.4 Observe that geomembrane overlap and panel adjustment are correct prior to seaming.

d2.5 For extrusion welding, observe that the geomembrane is pre-beveled and the geomembrane is properly abraded and that the panels are temporarily bonded.

d2.6 Observe that grind marks are covered with extrudite.

d2.7 Observe weather conditions (e.g., temperature, precipitation, wind) to ensure that they are acceptable for seaming.

d2.8 Record measurements of temperatures, pressures, and speed of seaming to ensure that they are as specified. Gages and dials on seaming equipment shall be checked and readings recorded.

d2.9 Observe that the geomembrane is not damaged by equipment or personnel during the seaming process.

d2.10 Observe that no solvents or adhesives are used.

e. Anchorage to Concrete Structures:

e1. Where the Design Drawings specify attaching / anchoring the geomembrane to concrete structures, CQA Geosynthetics Inspectors shall make the following inspections, at a minimum:

e1.1 Observations to ensure that all objects that are placed adjacent to the geomembrane (i.e., batten bars) are smooth and free of objects or conditions that may damage the geomembrane.

e1.2 Observations to ensure that all anchors are complete:

e1.2.1 Batten bars of the specified material, width, and thickness and prepunched at the specified spacing.

e1.2.2 Anchor bolts of the specified size and material.

e1.2.3 Anchor bolts spaced as specified.

e2. Observations to confirm that all cover connections are installed as specified. Cover connections shall be verified for appropriate clamp and caulking use, for appropriate material, for good seaming, and for good housekeeping practices. No sharp bends on concrete surfaces shall be allowed.

f. Geomembrane Production Seam Testing:

f1. Non-Destructive Field Testing: Activities to be observed and documented include the following:

f1.1 Observe that 100 percent of the seam lengths are tested using non-destructive procedures.

f1.2 Observe that testing is performed as seaming progresses.

f1.3 Observe that the correct procedures are used for testing each type of seam.

f1.4 Observe all non-destructive test procedures.

f1.5 For air pressure testing, observe that the equipment, procedures, and air pressure meet specified requirements. Observe that all testing is properly documented.

f1.6 For vacuum box testing, observe that testing is being performed correctly.

f1.7 For inaccessible seams, observe that a procedure acceptable to the Owner is used to test the seams.

f1.8 Observe that all leaks are marked, recorded as to location, and repaired.

f1.9 Observe that repairs are made in accordance with approved techniques.

f1.10 Observe that all repairs are re-tested and that no leakage is present.

f1.11 Review leakage data for possible patterns. Make suggestions to the GW Contractor if data shows a consistent pattern of failure of a particular machine or crew.

f1.12 Audit documentation of testing prepared by the GW Contractor to make sure that the location of leaks is identified on the drawings.

f2. Destructive Testing:

f2.1 Destructive seam testing shall be performed at the frequencies specified in GW Specification Section 319022.

f2.2 The CQA Geosynthetics Inspector shall specify the location where each sample shall be taken and record data for each sample.

f2.3 The CQA Geosynthetics Inspector shall designate any additional test locations that may be necessary. These locations may be based on the suspicion of contamination by dirt or moisture, change in seaming materials, increase in failed nondestructive tests, and other causes that could result in unacceptable seams.

f2.4 Laboratory testing shall be performed in accordance with the GW Specification Section 319022. Predetermined pass/fail values are specified in that section. Verbal laboratory test results shall be given to the Geosynthetics Contractor within 24 hours of receipt of the test samples. Written results shall follow within one week.

f2.5 Audit and document the results of laboratory testing on seam samples. Note any sample that does not pass and identify the location on the geomembrane for repair in the field and on the drawings.

f3. Repair of Failed Seams:

f3.1 For field seams that fail, the seam can either be reconstructed between the failed and any previous passed seam location or the installer can go on either side of the failed seam location (10-foot minimum), take another sample, and test it. If that sample passes, reconstruct the seam between the two locations. If it fails, the process shall be continued. In all cases, acceptable seams must be bounded by two passed test locations. The CQA Geosynthetics Inspector shall document the procedure used and results of tests.

f3.2 Document that repairs are made. Documentation shall include location, type, and method of repair.

305. CQA TESTING AND INSPECTION REQUIREMENTS FOR ENGINEERED SYNTHETIC TURF COMPONENT OF FINAL COVER SYSTEM

305.1 Initial Material Certification:

a. Prior to shipment of any synthetic turf materials, the CQA Contractor shall assemble, document the receipt of, and audit the Synthetic Turf Manufacturer submittals listed below for conformance with the GW Specification:

a1.1 Certification that the properties of the synthetic turf panels meet GW Specification requirements and are guaranteed by the Synthetic Turf Manufacturer.

a1.2 Copies of the Synthetic Turf Manufacturer's Quality Control and Construction Quality Control Plans. The plans shall include the inspection records and test results required by the GW Specification.

305.2 Transportation, Handling, and Storage:

a. Documentation of Delivery:

a1. Document arrival of rolls of synthetic turf.

a2. Document that each roll is marked with the following information:

a2.1 Name of Synthetic Turf Manufacturer.

a2.2 Product identification.

a2.3 Date of manufacture of synthetic turf.

a2.4 Lot number.

a2.5 Roll identification number.

a3. Check the Quality Control certificates on each roll to verify that the rolls received onsite meet the GW Specification. Take the identifying labels from each roll or pallet and save them for future reference.

a4. Recommend rejection of rolls which do not have the required documentation and ensure that the rolls are removed from the site.

b. Inspection of Manufactured Rolls:

b1. Inspect all manufactured rolls upon delivery to the site.

b2. Ensure that packaging is secure and that no damage has occurred.

b3. If damage to packaging has occurred, inspect exposed roll surfaces, and note and identify any damage or repairable flaws. Note: This visual observation shall be conducted without unrolling rolls unless the extent of surface damage indicates that internal damage may be present.

b4. If damage to just the packaging has occurred, document repair of the packaging.

b5. If damage to the product has occurred, document that the damage or flaws are repaired or that the damaged material is wasted and removed from the project site.

b6. Report all damage to the Owner.

c. Handling:

c1. Inspect the onsite handling equipment being used to move materials to ensure that it is adequate to minimize the risk of damage to materials.

c2. Inspect the handling of materials by installing personnel to ensure that care is used.

d. Storage:

d1. Inspect the storage facility.

d2. Inspect the ground surface to ensure that it is dry, relatively level, smooth and free of rocks, holes, and debris.

d3. Document unsafe or improper storage conditions.

305.3 Preconstruction Testing:

a. Prior to material shipment to the site, the Synthetic Turf Manufacturer shall submit to the CQA Contractor representative samples of the synthetic turf material to be shipped to the site, along with chain of custody and certification that the samples submitted are from the synthetic turf material to be delivered to the site. The CQA Geosynthetics Inspector shall perform conformance testing of the received synthetic turf samples in accordance with Table 014362-6. The laboratory tests shall be performed at least at the corresponding minimum frequencies specified in Table 014362-6.

b. Test acceptance criteria shall be as specified in GW Specification Section 311522. If the results from any of the tests in Table 014362-6 do not meet the respective pass/fail thresholds, then the CQA Officer shall reject all synthetic turf material from the lot corresponding to the failed test(s) for use in the project.

305.4 Inspections and Testing During Construction:

a. CQA activities during installation of the synthetic turf component of the ClosureTurf® final cover system shall include visual observations and field testing to ensure that the synthetic turf is installed in accordance with GW Specification requirements. Field observations and tests shall be performed in accordance with the requirements specified in Table 014362-6 and the following paragraphs.

b. Weather Conditions for Placement:

b1. Observe and document the weather conditions (i.e., temperature, humidity, precipitation, and wind) to ensure that they are acceptable for geosynthetic material placement and seaming. The GW Specification describes acceptable weather conditions.

b2. If the weather becomes unacceptable for installation of the geosynthetic materials, recommend stopping the installation until conditions again become favorable, thus minimizing the potential for unacceptable installation.

c. Synthetic Turf Placement:

c1. Prior to placement of the synthetic turf cover, visually inspect the geomembrane surface to be covered to ensure that it meets the requirements of the GW Specification (i.e., has been seamed, tested, and approved for further ClosureTurf® component deployment). Confirm that it is substantially free of debris and/or large scraps. Field observations shall be performed in accordance with the requirements specified in Table 014362-6.

c2. Provide documentation of daily inspection of the surface to be covered for the area of synthetic turf to be placed that day.

c3. As each synthetic turf panel is placed, visually inspect the panel for tears, punctures, and thin spots. The CQA Geosynthetics Inspector shall traverse the panels in such a way that the entire surface is inspected. Any defects shall be documented on a drawing and marked on the synthetic turf for repair.

c4. Document that the locations of synthetic turf splices meet the general requirements for seaming contained in GW Specification Section 311522.

c5. During placement:

c5.1 Make measurements to confirm that required overlap of adjacent synthetic turf sheets has been achieved, that proper temporary anchorage is being used (e.g., sand bags or tires), and that the synthetic turf is being placed in a relaxed (nonstressed) state.

c5.2 Observe and verify that tufts in the synthetic turf are not excessively pulled out by the installation process.

c5.3 Observe and verify that the first synthetic turf panel deployed on a slope has the turf filaments facing upward.

c5.4 Observe and verify that the turf filaments in all synthetic turf panels are pointed upslope after deployment is complete.

c5.5 Observe and verify that equipment being used to place the synthetic turf panels does not damage the synthetic turf or underlying geomembrane.

c6. Document any panel damage from adverse weather conditions, equipment, inadequate temporary anchoring, or rough handling. Mark the location of damage on the synthetic turf for repair and on a drawing.

c7. Document improper synthetic turf panel placement and, as a result, inadequate coverage with the available materials or an excess number of field seams.

c8. Document inadequate sheet overlap resulting in poor quality seams.

c9. Document nonwelded or cut panels.

c10. Document repair of damage. Documentation shall include location, type, and method of repair.

d. Synthetic Turf Splicing and Seam Repair:

d1. Trial Welds Prior to Beginning Seaming:

d1.1 If successive synthetic turf panels are to be spliced by welding, observe that trial welds are being made at the frequency specified in GW Specification Section 311522.

d1.2 Observe fabrication of test strips and note that test strips are fabricated correctly.

d1.3 Specify where samples are to be cut from the test strips and witness all peel/pull tests.

d1.4 Observe documentation of results of the peel/pull tests by the GW Contractor.

d1.5 Audit documentation of each trial weld received from the GW Contractor.

d1.6 Document the following information for each trial weld:

d1.6.1 Names of the seaming personnel.

d1.6.2 Name of the fusion seaming technician.

d1.6.3 The welding apparatus number and temperature.

d1.6.4 Date, time, and ambient air temperature.

d2. Splicing and Seam Repair. Activities that shall be documented during field splicing operations include:

d2.1 Observe that the synthetic turf is free from dirt, dust, and moisture.

d2.2 Observe that synthetic turf panel overlap and adjustment are correct prior to splicing.

d2.3 Observe that the synthetic turf is not damaged by equipment or personnel during the splicing process. Observe that any damages or defects are repaired in accordance with the GW Specification and/or the Synthetic Turf Manufacturer’s recommendations.

d2.4 For synthetic turf panels spliced by sewing:

d2.4.1 Observe that the sewing materials and equipment are as specified in GW Specification Section 311522.

d2.4.2 Observe that seams are sewn as specified in GW Specification Section 311522.

d2.5 For synthetic turf panels spliced by fusion welding (heat bonding):

d2.5.1 Observe that the seaming materials and seam welding equipment are as specified.

d2.5.2 Observe weather conditions (e.g., temperature, humidity, wind) to ensure that they are acceptable for seaming.

d2.5.3 Measurements of temperatures, pressures, and speed of seaming to ensure that they are as specified. Gages and dials on seaming equipment shall be checked and readings recorded.

d2.5.4 Observe that no solvents or adhesives are used.

306. CQA TESTING AND INSPECTION REQUIREMENTS FOR BALLAST INFILL MATERIAL

306.1 Initial Material Certification:

a. Prior to shipment of any materials, the CQA Contractor shall assemble, document the receipt of, and audit the material supplier's test results and certification(s) that the properties of the material(s) meet GW Specification requirements.

306.2 Inspections and Testing During Construction:

a. CQA activities during placement of Ballast Infill shall include visual observations and field testing to ensure that Ballast Infill is installed in accordance with GW Specification requirements. Field observations and tests shall be performed in accordance with the requirements specified in Table 014362-7 and the following paragraphs.

b. Visual Observation of Infill Placement:

b1. Record type of equipment in use.

b2. Observe installation method(s) are consistent with the method(s) presented to the Owner by the Ballast Infill Installer during the pre-construction meeting.

b3. Observe the Ballast Infill material is worked into the synthetic turf between the synthetic yarn blades.

b4. Observe that the underlying geomembrane and synthetic turf components are not displaced or damaged.

b5. Observe that Ballast Infill material is not placed when snow and/or ice are present on the synthetic turf.

c. Laboratory and Field Tests:

c1. Laboratory and field testing shall be performed in accordance with the requirements specified in Table 014362-7.

d. Test Acceptance Criteria:

d1. Acceptance criteria shall be as specified in GW Specification Section 311522.

307. CQA TESTING AND INSPECTION REQUIREMENTS FOR ANCHOR TRENCH:

307.1 Inspections and Testing During Construction:

a. CQA activities during excavation, formation, and backfilling of anchor trenches for the ponds' final cover systems shall include visual observations and field testing to ensure that, where specified on the Design Drawings, anchor trenches are constructed in accordance with GW Specification requirements. Field observations and tests shall be performed in accordance with the requirements specified in Table 014362-4 and the following paragraphs.

b. Measurements:

b1. Perform measurements of the anchor trench to ensure that the trench width, depth, and location are as specified on the Design Drawings.

c. Observations:

c1. Observe that the trench corners are rounded as specified.

c2. Observe that good housekeeping practices are followed in the trenching operation by not allowing soil to fall back into the trench or down the slope and not allowing water to pond in the trench.

c3. Observe that the trench is backfilled as soon as possible and compacted such that the geomembrane (both geomembranes and the synthetic turf (if applicable)) are not damaged.

308. SAMPLING PATTERN

308.1 The CQA Officer shall establish a completely random sampling pattern for determining the choice of sampling points for field tests. Each block of work shall be subdivided into a sampling grid with at least 10 times as many grids as samples or tests to be taken or as directed by the Owner. The grid shall have a numeric identification system devised to distinguish each set of tests for a specific area from all other sets of tests. Each lift shall have a separate grid.

308.2 Sampling points shall be chosen by a random number generator or other acceptable method to obtain uniform coverage. Tests shall be numbered beginning with test number one (1) and no numbers shall be skipped. In areas where a test of any type fails to meet specification criteria and a retest is performed, the retest shall have the same test number as the original test except that an “R” shall follow the test designation.

309. VERIFICATION AND CALIBRATION

309.1 Verification of Selected Field Tests:

a. The following tests shall be verified at the following frequency:

Test Requiring Verification	Frequency of Verification Test
Nuclear In-Place Density and Nuclear In-Place Moisture Content, ASTM D 6938	Note 1
“Quick” Moisture Content Test Using Microwave, (ASTM D4643) or Gas Stove, Frying Pan, or Infrared Oven, (ASTM D4959), etc.	One standard oven-dry moisture content (ASTM D2216) test per 20 quick tests.
Lift Thickness Measured Using a Shaft or Shovel	One lift thickness verified by measurement every two acre-lifts.

Notes:

1 – A standard block test as required by ASTM D6938 shall be performed at the start of each day on each Nuclear apparatus that will be used that day. At the start of earthwork construction, a series of five Nuclear tests and five sand cone or rubber balloon tests

shall be performed in the borrow area, or area to be excavated, on a compacted test strip to calibrate the Nuclear apparatus. During construction, one of the last Nuclear readings performed at the end of each day shall be verified using a sand cone (ASTM D1556) or rubber balloon (ASTM D2167) density and moisture content test for each apparatus used that day. The average wet density and moisture content for each apparatus shall be computed for every ten tests. If variations greater than those permitted by the ASTM's occur, corrections shall be applied to all future tests for the apparatus until the next set of 10 tests is performed.

309.2 Calibration:

a. Procedures for calibration of field and laboratory testing equipment shall be submitted by the CQA Contractor prior to the start of testing. These procedures shall meet ASTM requirements.

310. <u>CORRECTIVE ACTION PROCEDURES</u>

310.1 Failure of Material Quality Tests:

a. The GW Contractor and the Owner shall be notified immediately if gradation or Atterberg limits tests do not meet GW Specification acceptance criteria. Failure to meet acceptance criteria of one or more of these groups of tests may indicate problems with the quality of soil materials. The GW Contractor shall cease all construction activities until the source of the problem or "out-of-specification" materials is identified. Construction shall not begin again until materials and installation procedures meeting GW Specification acceptance criteria are identified for use.

310.2 Failure of Field Density or Moisture Content Tests:

a. If the results of field density or moisture content tests fail to meet GW Specification acceptance criteria, those tests shall be re-run after recompaction. Judgment shall be used to select re-test locations suspected of having lower than specified density or moisture content. If the results of the re-test meet specification requirements, the compaction can be considered acceptable. If the results of the re-tests show out-of-specification densities or moisture contents, the CQA Officer shall immediately inform the Owner of the extent of the defective area. The defective area shall be removed and reconstructed or recompacted by the GW Contractor.

TABLE 014362-1

CQA FOR SUBGRADE (CCR)

No.	Characteristic to be Monitored	Test		
		Monitoring / Testing Method	Test Method Reference	Minimum Test Frequency
1	Proofrolling of Subgrade	Observation		Continuous
2	Field Density / Soil Compaction	Nuclear Density Gauge, Sand Cone or Rubber Balloon Method	ASTM D6938(1), ASTM D2167, or ASTM D1556	One per 500 cubic yards, and for all changes in material.
3	Field Moisture Content	Nuclear Density Gauge or Direct Heat Method	ASTM D6938(1) or ASTM D4959	At each field density test location.
4	Uncompacted and Compacted Thickness of Each Lift	Direct Measurement		Four per acre per lift.
5	Moisture-Density Curve	Proctor or Index Density	ASTM D2216 and ASTM D1557, or ASTM D4253 and ASTM D4254	One per 500 cubic yards, and for all changes in material.
6	Surface Lines and Grades	Surveying		One per 50-foot grid and at grade breaks (i.e., toe and top of slopes).

Notes:

(1) ASTM D6938 Procedure B (backscatter) shall be used to measure the as-compacted density of CCR material.

TABLE 014362-2

CQA FOR STRUCTURAL FILL MATERIAL

No.	Characteristic to be Monitored	Test		
		Monitoring / Testing Method	Test Method Reference	Minimum Test Frequency
1	In-Situ Moisture Content	Laboratory Moisture Content	ASTM D2216	One per 500 cubic yards, and for each moisture density curve sample.
2	Moisture Density Curve	Proctor	ASTM D1557	One per 500 cubic yards, and for all changes in material.
3	Soil Index Properties	Atterberg Limits	ASTM D4318	One per 500 cubic yards, and for each moisture density curve sample.
4	Soil Index Properties	Grain Size	ASTM D422	One per 500 cubic yards, and for each moisture density curve sample.
5	Soil Classification	Unified Soil Classification System	ASTM D2487	One per 500 cubic yards, and for each moisture density curve sample.
6	Field Density / Soil Compaction	Nuclear Density Gauge, Sand Cone or Rubber Balloon Method	ASTM D6938(1), ASTM D2167, or ASTM D1556	Four per lift. One per 500 cubic yards.
7	Field Moisture Content	Nuclear Density Gauge or Direct Heat Method	ASTM D6938(1) or ASTM D4959	At each field density test location.
8	Uncompacted and Compacted Thickness of Each Lift	Direct Measurement		Four per acre per lift.
9	Surface Lines and Grades	Surveying		One per 50-foot grid and at grade breaks (i.e., toe and top of slopes).

Notes:

(1) ASTM D6938 Procedure B (backscatter) shall be used to measure the as-compacted density of Structural Fill material.

TABLE 014362-3

CQA FOR AREAS TO RECEIVE GEOMEMBRANE

No.	Characteristic to be Monitored	Test		
		Monitoring / Testing Method	Test Method Reference	Minimum Test Frequency
1	Certification of Surface Elevation Prior to Geomembrane	Surveying		One per 50-foot grid and at grade breaks (toe and top of slopes).
2	Subgrade Firm and Unyielding	Observe and Document Proofroll		Continuous on subgrade surface.
3	Slope Condition	Observe and document absence of erosion, slope failures, loose material or other non-conforming conditions on slopes		Continuous on slopes
4	Subgrade Free of Deleterious Conditions	Observe and document exposed subgrade is free from • Irregularities • Protrusions • Loose soil or soft spots • Abrupt changes in grade • Debris • Clods • Stones • Roots • Organic material • Moisture seeps, puddling, or ponding • Frozen material		Continuous

TABLE 014362-4

CQA FOR ANCHOR TRENCHES

		Test		
No.	**Characteristic to be Monitored**	**Monitoring / Testing Method**	**Test Method Reference**	**Minimum Test Frequency**
1	Trench Geometry	Measurement		2 locations per trench 1 location per 100 ft of trench
2	Trench Condition	Observe and Document • Trench free of sloughed material • Trench free from ponded water • Absence of loose material below geosynthetics		Continuous
3	Trench Backfill	Observe and document prompt backfill of trenches		Continuous
4	Field Density / Soil Compaction	Nuclear Density Gauge, Sand Cone or Rubber Balloon Method	ASTM D6938, ASTM D2167, or ASTM D1556	Two per lift One per 200 ft of trench per lift

TABLE 014362-5

CQA FOR HDPE GEOMEMBRANE

		Test		
No.	**Characteristic to be Monitored**	**Monitoring / Testing Method**	**Test Method Reference**	**Minimum Test Frequency**
1	Receipt of Delivery	Observe and document: • Name of Geomembrane Manufacturer • Product identification • Date of manufacture of the geomembrane • Roll identification number • Geomembrane thickness and type • Physical dimensions (length, width) • Manufacturing lot number • Panel number and weight • Order number	Visual	Each Roll
2	Inspection of Rolls	Lack of uniformity	Visual	Each Roll
		Damage, Tears, Punctures	Visual	Each Roll
		Imperfections, Blisters, Excessive Folding	Visual	Each Roll
3	Geomembrane Properties	Thickness	ASTM D5994	5 per roll of geomembrane delivered at locations evenly distributed throughout roll
		Density	ASTM D1505 / D792	Per resin batch, but not less than once per 20,000 SF of geomembrane
		Tensile properties (strength and elongation at yield and at break)	ASTM D6693	Per resin batch, but not less than once per 20,000 SF of geomembrane
		Tear resistance	ASTM D1004	Per resin batch, but not less than once per 20,000 SF of geomembrane

No.	Characteristic to be Monitored	Test		
		Monitoring / Testing Method	Test Method Reference	Minimum Test Frequency
		Puncture resistance	ASTM D4833	Per resin batch, but not less than once per 20,000 SF of geomembrane
		Carbon black content	ASTM D4218	Per resin batch, but not less than once per 20,000 SF of geomembrane
		Carbon black dispersion	ASTM D5596	Per resin batch, but not less than once per 20,000 SF of geomembrane
4	Weather and Site Conditions at Time of HDPE Geomembrane Deployment and Seaming	Observe and document weather and site conditions		Continuous
5	Panel Deployment	Observe and document: • Relaxed deployment • Damage prevention • Wrinkles minimized • Temporary anchorage • Protected from damage • Proper overlap • Seam location	Visual	Continuous
6	Trial Welds	Observe and document Geosynthetics Contractor staff performing and testing trial welds		• Prior to each seaming period. • Every 4 hours of continuous seaming. • Whenever personnel or equipment are changed. • When climatic conditions result in wide changes in geomembrane temperature. • When requested by the CQA Geosynthetics Inspector(s) for any seaming crew or piece of welding equipment if problems are suspected.

No.	Characteristic to be Monitored	Test		
		Monitoring / Testing Method	Test Method Reference	Minimum Test Frequency
7	Preparation for Seaming	Observe and document: • HDPE geomembrane is clean • Minimum wrinkles and fish mouths • Fish mouths cut as necessary to lay flat • Film surface for seaming	Visual	Continuous
8	Seaming	Observe and document: • Materials • Equipment • Staff • Acceptable procedures • Weather • Pressure • Speed • Damage • Absence of solvents	Visual	Continuous
9	Non-Destructive Seam Tests	Observe and document: • Equipment • Methods • Pressures • Leaks marked • Repairs made • Repairs retested	Double-Wedge Fusion Welds: ASTM D5820 and GRI GM6 Extrusion Welds: ASTM D5641 Inaccessible Seams: Electric Wire Testing	100 percent of seam lengths shall be tested.

No.	Characteristic to be Monitored	Test		
		Monitoring / Testing Method	Test Method Reference	Minimum Test Frequency
10	Destructive Seam Samples and Testing	Observe and document • Removal of all destructive test samples • Repair of sampled areas • Testing of repairs Label all samples Ship all samples to CQA Contractor's testing laboratory	Shear strength and peel adhesion	• One test per every 500 linear feet of seam length if the seam is welded with a fusion weld. • One test per every 400 linear feet of seam length if the seam is welded with an extrusion weld. • One test for each seaming machine

TABLE 014362-6

CQA FOR SYNTHETIC TURF

No.	Characteristic to be Monitored	Test		
		Monitoring / Testing Method	Test Method Reference	Minimum Test Frequency
1	Receipt of Delivery	Observe and document: • Name of Synthetic Turf Manufacturer • Product identification • Date of manufacture of the synthetic turf • Lot number • Roll identification number	Visual	Each Roll
2	Inspection of Rolls	Lack of uniformity	Visual	Each Roll
		Damage, Tears, Punctures	Visual	Each Roll
		Imperfections, Blisters, Excessive Folding	Visual	Each Roll
3	Synthetic Turf Properties	Total Product Weight	ASTM D5261	Per 20,000 SF of synthetic turf
		CBR Puncture	ASTM D6241	Per 20,000 SF of synthetic turf
		Tensile Strength of Product	ASTM D4595	Per 20,000 SF of synthetic turf
		Tensile Strength of Yarn	ASTM D2256	Per 20,000 SF of synthetic turf
4	Weather and Site Conditions at Time of Synthetic Turf Deployment and Seaming	Observe and document weather and site conditions		Continuous

No.	Characteristic to be Monitored	Test		
		Monitoring / Testing Method	Test Method Reference	Minimum Test Frequency
5	Panel Deployment	Observe and document: • Geomembrane cover has been seamed, tested, and approved and is substantially free of debris and/or large scraps • Relaxed deployment • Damage prevention • Wrinkles minimized • Temporary anchorage • Protected from damage • Proper overlap • Seam location • First synthetic turf panel on a slope has turf filaments facing upward • Turf filaments point upslope • Equipment does not damage synthetic turf or underlying geomembrane	Visual	Continuous

No.	Characteristic to be Monitored	Test		
		Monitoring / Testing Method	Test Method Reference	Minimum Test Frequency
6	Trial Welds	Observe and document Geosynthetics Contractor staff performing and testing trial welds		• Prior to each seaming period. • Every 4 hours of continuous seaming. • Whenever personnel or equipment are changed. • When the welding apparatus has been turned off longer than 30 minutes. • When climatic conditions result in wide changes in geotextile temperature. • When requested by the CQA Geosynthetics Inspector(s) for any seaming crew or piece of welding equipment if problems are suspected.
7	Seaming	Observe and document: • Seaming Method • Seaming materials and equipment • For sewn seams: stitching type and length • For welded seams: weather, pressure, speed, and absence of solvents • Damage and repairs	Visual	Continuous
8	Repairs	Identify areas to be patched. Document patching method and location.	Visual	Continuous.

TABLE 014362-7

CQA FOR BALLAST INFILL MATERIAL

		Test		
No.	**Characteristic to be Monitored**	**Monitoring / Testing Method**	**Test Method Reference**	**Minimum Test Frequency**
1	Soil Index Properties	Grain Size	ASTM C136	One per 175 cubic yards
2	Thickness	Direct measurement using digital caliper or Owner-approved alternate		Twenty (20) per acre.

END OF SECTION 014362

ATTACHMENT 6
FACILITY/COMPONENT PLANS AND SPECIFICATIONS

Attachment 6 – No Attachment

ATTACHMENT 7
CLOSURE CONSTRUCTION

Attachment 7-1 Ponds 1N, 1S, 2S, and 3S Closure Plans

MWG

Midwest Generation, LLC

Will County Generating Station

Final Written Closure Plan for Pond 1N & Pond 1S

Revision 1

July 28, 2023

Issue Purpose: Use

Project No.: 12661-153

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Sargent & Lundy

TABLE OF CONTENTS

1.0 PURPOSE

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.720(b)

Pond 1N and Pond 1S at Midwest Generation, LLC's (MWG) Will County Generating Station ("Will County" or the "Station") are former ash ponds that were taken out of service in 2010. The water in both Ponds 1N and 1S was subsequently drained, and the CCR remaining in both ponds was regraded such that the ponds can no longer accumulate water. Accordingly, both former ash ponds are regulated as inactive coal combustion residual (CCR) surface impoundments under the Illinois Pollution Control Board's "Standards for the Disposal of Coal Combustion Residuals in CCR Surface Impoundments," which are codified in Part 845 to Title 35 of the Illinois Administrative Code (35 Ill. Adm. Code 845, Ref. 1) and are also referred to herein as the "Illinois CCR Rule."

Pursuant to 35 Ill. Adm. Code 845.720(b), this document provides the final written closure plan for Ponds 1N and 1S at Will County. MWG intends to close these former ash ponds by leaving the impounded CCR in place and installing final cover systems over the impoundments in accordance with 35 Ill. Adm. Code 845.750. This plan describes the steps necessary to close Ponds 1N and 1S in this manner.

2.0 CLOSURE PLAN NARRATIVE DESCRIPTION

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.720(a)(1)(A) & 845.750(a)

Pursuant to 35 Ill. Adm. Code 845.750(a), Ponds 1N and 1S will be closed by leaving the CCR stored in each pond in place and installing a final cover system over each impoundment. Each final cover system will be designed in accordance with the requirements specified in 35 Ill. Adm. Code 845.750(c) and as described in the following sections of this closure plan.

The anticipated closure in-place of Ponds 1N and 1S will be performed in accordance with the following sequential steps:

1. Removing existing vegetation within each pond;
2. After existing vegetation has been removed, establishing the slopes for the final cover system by:
    a. Grading the ash material to specified lines and grades, and
    b. If enough ash is not available in a pond, placing structural fill material into the subject pond and to reach the specified lines and grades of the final cover system design;
3. Installing an engineered final cover system (ClosureTurf®), which consists of:
    a. Structured geomembrane as the system's low permeability layer, and
    b. Synthetic turf and specialized sand infill as the system's final protective layer; and
4. Initiating post-closure monitoring of groundwater and final cover system integrity.

Because Ponds 1N and 1S were re-graded to prevent the accumulation of water after the ponds were taken out of service in 2010, it is not anticipated that free liquids will need to be removed from the ponds prior to establishing the lines and grades for their respective final cover systems. Indeed, no visible water has been observed in either pond during the weekly inspections MWG conducts in accordance with the Illinois CCR Rule (Refs. 2 and 3). If free water is observed / discovered during closure activities (e.g., water from a recent storm event), the water will be removed prior to re-grading the remaining CCR to support the final cover system. This will be accomplished by excavating sumps and trenches within the CCR and using portable pumps to either pump water to the subject pond's discharge pipe or over the subject pond's weir into the concrete overflow trough.

3.0 FINAL COVER SYSTEM DESCRIPTION

Illinois CCR Rule References: 35 Ill. Adm. Code 845.720(a)(1)(C) & 845.750(a)

Pursuant to the closure performance standards prescribed in 35 Ill. Adm. Code 845.750(a), the final cover system encapsulating the CCR in Ponds 1N and 1S will:

1. Minimize the post-closure infiltration of precipitation into the CCR;
2. Minimize the risk of release of CCR or contaminated run-off to the ground or surface waters, or to the atmosphere;
3. Preclude the probability of future impoundment of water, sediment, or slurry;
4. Provide major slope stability to prevent sloughing of the final cover system during the closure and post-closure care periods;
5. Minimize future maintenance; and
6. Allow closure activities to be completed as quickly as practical consistent with recognized and generally accepted good engineering practices.

In addition to the preceding performance criteria, the final cover systems installed over Ponds 1N and 1S must meet the design criteria promulgated by 35 Ill. Adm. Code 845.750(c), which requires a final cover system to consist of at least two layers: (1) a lower, low-permeability layer for infiltration control and (2) an upper, final protective layer for (a) erosion control and (b) protecting the low permeability layer. MWG plans to install an engineered final cover system developed by Watershed Geosynthetics, LLC (Watershed Geo) called ClosureTurf®, which will provide the performance metrics stipulated by the Illinois CCR Rule for both the low-permeability and final protective layers. ClosureTurf® consists of a structured geomembrane under an engineered synthetic turf with a specialized sand infill. It should be noted that the products used to manufacture these materials are free of per- and polyfluoroalkyl substances (PFAS). Moreover, Watershed Geo has designed its ClosureTurf® product specifically for environmental containment applications, and it has been tested to ensure long-term compliance with the performance criteria discussed in the following subsections.

3.1 ESTABLISH GRADE & SUPPORT FOR FINAL COVER SYSTEM

Illinois CCR Rule References: 35 Ill. Adm. Code 845.750(a)(2), 845.750(a)(3), & 845.750(c)(3))

To accomplish the performance requirements stipulated by 35 Ill. Adm. Code 845.750, the CCR remaining in Ponds 1N and 1S will be graded to direct non-contact storm water run-off to the concrete overflow trough at the western end of each pond. Additional structural fill material will be placed over the stabilized CCR in each pond to establish the lines and grades for this storm water management scheme if sufficient quantities of CCR are not present in either pond to establish the lines and grades specified for the final cover system design. The slopes of this foundation layer for each pond's final cover system will be steep enough to prevent storm water from ponding over the cap but flat enough to limit erosion caused by the storm water run-off. These slopes will also be designed to accommodate potential settling and subsidence while maintaining a positive drainage strategy. In addition, the foundation layer's slopes (and the final cover system in general) will also include measures that provide slope stability to prevent the sloughing or movement of the final cover system during the closure and post-closure care period. Finally, the foundation layer surface will be prepared such that it is free from large, protruding, or sharp materials that could otherwise cause damage to the overlying low permeability layer.

3.2 LOW PERMEABILITY LAYER

Illinois CCR Rule References: 35 Ill. Adm. Code 845.750(a)(1) & 845.750(c)(1)

The structured geomembrane component of the ClosureTurf® system will be placed on top of the graded CCR (and structural fill if necessary) in Ponds 1N and 1S to minimize the infiltration of precipitation through each pond during their post-closure lives. This low permeability layer will control stormwater run-off from the final cover system and will minimize (1) post-closure infiltration of storm water into the waste and (2) releases of CCR, leachate, or contaminated run-off to the ground or surface waters or to the atmosphere.

Table 1 lists the Illinois CCR Rule's design criteria for the low permeability layer of a final cover system installed over an inactive CCR surface impoundment. The structured geomembrane component of the ClosureTurf® system for Ponds 1N and 1S will be designed in accordance with this design criteria.

Table 1 – Illinois CCR Rule's Design Criteria for Low Permeability Layer in an Inactive CCR Surface Impoundment's Final Cover System

Construction Material	Parameter	Illinois CCR Rule Design Criterion (35 Ill. Adm. Code 845.750(c)(1))
Earthen Material	Thickness	3 feet minimum
	Hydraulic Conductivity	Least of: • Permeability of any bottom liner system or natural subsoils • 1×10^{-7} cm/sec
	Compaction	Minimize void spaces
Geomembrane	Thickness	40 mil
	Hydraulic Flux	Equivalent or superior reduction in infiltration as a low permeability layer constructed with earthen material
	Prepared Subgrade	Free from sharp objects and other materials that may cause damage

Ponds 1N and 1S both have Poz-o-Pac[1] liners along their respective floors and sideslopes. Based on permeability testing performed on a sample taken from the Poz-o-Pac liner in another ash pond at Will County in 2012, the Poz-o-Pac liners in Ponds 1N and 1S are expected to have hydraulic conductivities on the order of 1×10^{-5} cm/sec. Therefore, per 35 Ill. Adm. Code 845.750(c)(1), the low permeability layer in each pond's final cover system must have a permeability that is no more than 1×10^{-7} cm/sec. Pursuant to 35 Ill. Adm. Code 845.750(c)(1)(B), MWG plans to specify a 60-mil HDPE, structured geomembrane for the ClosureTurf® system installed over each pond.

As required by 35 Ill. Adm. Code 845.750(c)(1)(B)(i), Table 2 demonstrates that a 60-mil HDPE geomembrane will provide a superior reduction in infiltration when compared to a 3-foot-thick layer of earthen material with a hydraulic conductivity of 1×10^{-7} cm/sec. The liquid flow rate through a 3-foot-thick layer of earthen material is calculated using the equation derived from Darcy's Law for gravity flow through porous media that is specified by the Illinois CCR Rule as the basis for demonstrating compliance with the Rule's alternative composite liner design criteria (Ref. 1, §845.400(c)(3)). Meanwhile, the liquid flow rate through a

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[1] Per the Federal Highway Administration's (FHWA) "User Guidelines for Waste and Byproduct Materials in Pavement Construction" (Ref. 2), "Poz-o-Pac" was a patented base course product consisting of a blend of lime, fly ash, and aggregate. Per the FHWA guideline, Poz-o-Pac and similar formulations may be described as pozzolan-stabilized base (PSB) mixtures.

geomembrane liner is calculated using Bernoulli's equation for free flow through an orifice based on the assumption that one 2-mm-diameter hole is present in the geomembrane for every acre (4,000 m^2) of liner (Ref. 5). Both liquid flow rates calculated in Table 2 are based on the assumption that 5.96 inches (0.15 meter) of hydraulic head is present on the low permeability layer, which is the estimated 25-year, 24-hour precipitation depth at the Station (Ref. 6). This is a conservative assumption because the final cover system will be sloped to preclude the build-up of storm water on the low permeability layer.

Table 2 – Liquid Flow Rate Comparison Between Low Permeability Layers Constructed Using Geomembrane & Earthen Material

Parameter	Symbol	Value
Liquid Flow Rate Through Earthen Material		
Hydraulic Conductivity	k	1×10^{-9} m/sec
Hydraulic Head Above Layer	h	0.15 m
Layer Thickness	t	3 ft = 0.91 m
Hydraulic Gradient Through Earthen Material	$i = h / t$	0.16
Liquid Flow Rate Through Layer per Acre of Final Cover System (Ref. 1, §845.400(c)(3)).	$q = k \times (i + 1)$	1.16×10^{-9} m^3/sec/m^2
Liquid Flow Rate Through Geomembrane		
Hole Area in Geomembrane	a	3.1 mm^2 / 4000 m^2
Acceleration Due to Gravity	g	9.81 m/sec^2
Hydraulic Head Above Layer	h	0.15 m
Liquid Flow Rate Through Layer per Unit Area (Ref. 5)	$q = 0.6a(2gh)^{0.5}$	7.98×10^{-10} m^3/sec/m^2

3.3 FINAL PROTECTIVE LAYER

Illinois CCR Rule References: 35 Ill. Adm. Code 845.750(c)(2)

To minimize wind and water erosion, the ClosureTurf® system features an engineered synthetic turf with a thin (0.5- to 0.75-in. thick) layer of specialized sand infill that is installed over the structured geomembrane. The artificial turf component consists of a double-layer, woven geotextile base through which tufts of polyethylene fibers are inserted. This engineered synthetic turf and specialized sand infill will cover the entire structured geomembrane component and will be installed as soon as possible after deployment and welding of the geomembrane.

Research and testing performed by Watershed Geo has demonstrated that ClosureTurf® provides superior protection against wind and water erosion than a traditional final protective layer consisting of vegetated topsoil or other earthen materials (Ref. 7). Specifically, the engineered synthetic turf component has been tested at hurricane-level wind speeds (using a wind tunnel) and at storm rainfall intensities of more than 6 inches per hour. By comparison, the 100-year, 1-hour rainfall depth for Will County, Illinois, where the Station is located, is approximately 3.92 inches (Ref. 6). The most significant rainfall event to date at a site with a ClosureTurf® cap occurred in 2014 in Pensacola, Florida, where 22 inches of rain fell over 24 hours, and no damage to the final cover system was observed during the inspections that immediately followed the storm event. By comparison, the 100-year, 24-hour rainfall depth for Will County, Illinois is 11.14 inches (Ref. 6), or approximately 51% of the aforementioned 2014 storm event in Pensacola, Florida.

The aforementioned wind tunnel testing conducted on ClosureTurf® at hurricane-level wind speeds by Watershed Geo has also demonstrated that the 0.5- to 0.75-in.-thick, specialized sand infill layer provides enough weight to prevent wind from lifting the ClosureTurf® cap and subsequently exposing the underlying CCR to the atmosphere. The hydraulic performance of ClosureTurf® also is not affected by freezing temperatures and freeze-thaw conditions (Ref. 8). Because the final protective layer will consist of synthetic turf, there is no risk of roots penetrating the underlying geomembrane cap. Therefore, the engineered synthetic turf and specialized sand infill components of the proposed ClosureTurf® final cover system for Ponds 1N and 1S will provide equivalent or superior performance to the 3-foot-thick final protective layer specified in 35 Ill. Adm. Code 845.750(c)(2).

Finally, in addition to providing superior protection against wind and water erosion than a traditional cover system, ClosureTurf® also does not require as much maintenance as a vegetated final protective layer, which needs to be mowed regularly and may need to be reseeded, refertilized, and/or regraded throughout the former ash ponds' post-closure lives.

4.0 ESTIMATED MAXIMUM INVENTORY OF CCR

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.720(a)(1)(D)

Detailed records of the maximum inventories of CCR ever stored in Ponds 1N and 1S are not available. For the purposes of this closure plan, the maximum CCR inventories for Ponds 1N and 1S are conservatively based on their estimated maximum capacities, which are 19,259 and 17,037 cubic yards, respectively.

5.0 ESTIMATED COVER SURFACE AREA

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.720(a)(1)(E)

The estimated final cover surface areas for Ponds 1N and 1S are 2.13 and 1.94 acres, respectively. It is estimated that these areas represent the largest surface areas that will ever require final covers at any point over the ponds' active lives.

6.0 CLOSURE SCHEDULE

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.720(a)(1)(F)

Closure activities are anticipated to be performed concurrently for both Ponds 1N and 1S and are estimated to be completed in 2026. Table 3 lists the major milestones necessary for closing both ponds and the expected duration for completing each milestone.

Table 3 – Planning Level Schedule for Closing Ponds 1N & 1S

Activity	Estimated Duration
Prepare Closure Construction Design Documents	Complete
Obtain Closure Construction Permit from Illinois EPA	18 Months
Hire Contractor to Complete Closure Activities in Accordance with Illinois EPA Permit	4 Months
Remove Existing Vegetation	1 Month
Grade Existing Ash and Place and Grade Structural Fill as Needed	1 Month
Install Final Cover System	1 Month
Submit Closure Report and Certification to Illinois EPA	2 Weeks
Obtain Approval of Closure Report and Certification from Illinois EPA	3 Months
Complete and Certify Closure of Ponds 1N & 1S	--

7.0 AMENDMENTS TO CLOSURE PLAN

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.720(a)(3)

This closure plan will be amended in accordance with 35 Ill. Adm. Code 845.720(a)(3) if a change in the operation of either Pond 1N or Pond 1S would substantially affect this closure plan or if an unanticipated event necessitates a revision to this closure plan. Any and all amendments to this closure plan will be certified by a qualified professional engineer registered in the State of Illinois in accordance with 35 Ill. Adm. Code 845.720(a)(4).

8.0 COMPLETION OF CLOSURE ACTIVITIES

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.760

Upon completion of all closure activities required by 35 Ill. Adm. Code Part 845 and approved by the Illinois EPA in a construction permit, a closure report and a closure certification for Ponds 1N and 1S will be submitted to the Illinois EPA in accordance with 35 Ill. Adm. Code 845.760(e). The closure report will include (1) the engineering and hydrogeology reports containing any monitoring well completion reports, boring logs, all construction quality assurance (CQA) reports, certifications, designations of CQA officers-in-absentia required by 35 Ill. Adm. Code 845.290; (2) photographs with time, date, and location information relied upon for documentation of construction activities; (3) a written summary of the closure requirements and completed activities as stated in the closure plan in effect and 35 Ill. Adm. Code Part 845; and (4) any other information relied upon by the qualified professional engineer for certification. Pursuant to 35 Ill. Adm. Code 845.760(e)(2), the certification will be prepared by an independent, qualified professional engineer licensed in the State of Illinois and will verify that Ponds 1N and 1S have been closed in accordance with the closure plan in effect at the time of the closure work, the requirements of 35 Ill. Adm. Code Part 845. Finally, within 30 days of the Illinois EPA approving the closure report and closure certification, a notification of completion of closure will be prepared in accordance with 35 Ill. Adm. Code 845.760(f).

9.0 CERTIFICATION

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.720(a)(4)

I certify that:

- This final written closure plan for Pond 1N and Pond 1S was prepared by me or under my direct supervision.
- The work was conducted in accordance with the requirements of 35 Ill. Adm. Code Part 845.
- I am a registered professional engineer under the laws of the State of Illinois.

Certified By: Thomas J. Dehlin

Date: July 28, 2023

Seal:

THOMAS J. DEHLIN
062-069314

10.0 REFERENCES

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8. Hsuan, Y. *et al*. "Cold Temperatures and Free[ze]-Thaw Cycling Behavior of Geomembranes and Their Seams." GSI White Paper #28. Geosynthetic Institute. June 17, 2013.

MWG
Midwest Generation, LLC
Will County Generating Station

Final Written Closure Plan for South Ash Pond 2 & South Ash Pond 3

Revision 2
July 28, 2023
Issue Purpose: Use
Project No.: 12661-153

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Sargent & Lundy

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1.0 PURPOSE & SCOPE

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.720(b)
Federal CCR Rule Reference: 40 CFR 257.102(b)

1.1 PURPOSE

South Ash Pond 2 and South Ash Pond 3 at Midwest Generation, LLC's (MWG) Will County Generating Station ("Will County" or the "Station") are existing coal combustion residual (CCR) surface impoundments that are regulated by the Illinois Pollution Control Board's "Standards for the Disposal of Coal Combustion Residuals in CCR Surface Impoundments." These regulations are codified in Part 845 to Title 35 of the Illinois Administrative Code (35 Ill. Adm. Code 845, Ref. 1) and are also referred to herein as the "Illinois CCR Rule." South Ash Ponds 2 and 3 are also regulated by the U.S. Environmental Protection Agency's (EPA) "Standards for the Disposal of Coal Combustion Residuals in Landfills and Surface Impoundments," 40 CFR Part 257 Subpart D (Ref. 2), also referred to herein as the "Federal CCR Rule."

Pursuant to 35 Ill. Adm. Code 845.720(b) and 40 CFR 257.102(b), this document provides the final written closure plan for South Ash Ponds 2 and 3 at Will County. MWG intends to close these CCR surface impoundments by leaving the impounded CCR in place and installing final cover systems over the impoundments in accordance with 35 Ill. Adm. Code 845.750 and 40 CFR 257.102(d). This plan describes the steps necessary to close South Ash Ponds 2 and 3 in this manner.

1.2 SCOPE

Per the 2016 Water Infrastructure Improvements for the Nation (WIIN) Act, South Ash Ponds 2 and 3 will continue to be subject to both the Illinois and Federal CCR Rules until the U.S. EPA approves the Illinois EPA's CCR permit program. The Illinois EPA has yet to publish a timeline for submitting its proposed CCR permit program to the U.S. EPA for approval, and so this final written closure plan has been prepared pursuant to both sets of regulations.

2.0 CLOSURE PLAN NARRATIVE DESCRIPTION

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.720(a)(1)(A) & 845.750(a)
Federal CCR Rule Reference: 40 CFR 257.102(b)(1)(i) & 257.102(d)(1)

Pursuant to 35 Ill. Adm. Code 845.750(a) and 40 CFR 257.102(d), South Ash Ponds 2 and 3 will be closed by leaving the CCR stored in each pond in place and installing a final cover system over each impoundment. Each final cover system will be designed in accordance with the requirements specified in 35 Ill. Adm. Code 845.750(c) and 40 CFR 257.102(d)(3) and as described in the following sections of this closure plan.

The anticipated closure in-place of South Ash Ponds 2 and 3 will be performed in accordance with the following sequential steps:

1. Ceasing all CCR and non-CCR inflows to each pond;
2. Drawing down the free surface water in each pond by evaporation and by draining water into the concrete overflow trough at the west end of each pond;
3. Once the water elevation is below the weir elevation, promoting additional drainage and dewatering by:
    a. Excavating sumps and trenches within the ash material,
    b. Using portable pumps as necessary to remove additional water by pumping water over the weir into the concrete overflow trough, and/or
    c. Utilizing earthmoving equipment to move the ash within each pond;
4. Upon completion of dewatering and stabilization of the impounded ash, establishing the slopes for the final cover system by:
    a. Grading the ash material to specified lines and grades, and
    b. If enough ash is not available in a pond, placing structural fill material into the subject pond and to reach the specified lines and grades of the final cover system design;
5. Installing an engineered final cover system (ClosureTurf®), which consists of:
    a. Structured geomembrane as the system's low permeability layer, and
    b. Synthetic turf and specialized sand infill as the system's final protective layer; and
6. Initiating post-closure monitoring of groundwater and final cover system integrity.

3.0 FINAL COVER SYSTEM DESCRIPTION

Illinois CCR Rule References: 35 Ill. Adm. Code 845.720(a)(1)(C) & 845.750(a)
Federal CCR Rule References: 40 CFR 257.102(b)(1)(iii) & 257.102(d)(1)

Pursuant to the closure performance standards prescribed in 35 Ill. Adm. Code 845.750(a) and 40 CFR 257.102(d)(1), the final cover system encapsulating the CCR in South Ash Ponds 2 and 3 will:

1. Minimize the post-closure infiltration of precipitation into the CCR;
2. Minimize the risk of release of CCR or contaminated run-off to the ground or surface waters, or to the atmosphere;
3. Preclude the probability of future impoundment of water, sediment, or slurry;
4. Provide major slope stability to prevent sloughing of the final cover system during the closure and post-closure care periods;
5. Minimize future maintenance; and
6. Allow closure activities to be completed as quickly as practical consistent with recognized and generally accepted good engineering practices.

In addition to the preceding performance criteria, the final cover systems installed over South Ash Ponds 2 and 3 must meet the design criteria promulgated by 35 Ill. Adm. Code 845.750(c) and 40 CFR 257.102(d)(3), both of which require a final cover system to consist of at least two layers: (1) a lower, low-permeability layer for infiltration control and (2) an upper, final protective layer for (a) erosion control and (b) protecting the low permeability layer. MWG plans to install an engineered final cover system developed by Watershed Geosynthetics, LLC (Watershed Geo) called ClosureTurf®, which will provide the performance metrics stipulated by the Illinois and Federal CCR Rules for both the low-permeability and final protective layers . ClosureTurf® consists of a structured geomembrane under an engineered synthetic turf with a specialized sand infill. It should be noted that the products used to manufacture these materials are free of per- and polyfluoroalkyl substances (PFAS). Moreover, Watershed Geo has designed its ClosureTurf® product specifically for environmental containment applications, and it has been tested to ensure long-term compliance with the performance criteria discussed in the following subsections.

3.1 ESTABLISH GRADE & SUPPORT FOR FINAL COVER SYSTEM

Illinois CCR Rule References: 35 Ill. Adm. Code 845.750(a)(2), 845.750(a)(3), & 845.750(c)(3))
Federal CCR Rule References: 40 CFR 257.102(d)(1)(ii), 257.102(d)(1)(iii), & 257.102(d)(3)(i)(D)

To accomplish the performance requirements stipulated by 35 Ill. Adm. Code 845.750 and 40 CFR 257.102(d), the CCR remaining in South Ash Ponds 2 and 3 will be graded to direct non-contact storm water run-off to the concrete overflow trough at the western end of each pond. Additional structural fill material will be placed over the stabilized CCR in each pond to establish the lines and grades for this storm water management scheme if sufficient quantities of CCR are not present in either pond to establish the lines and grades specified for the final cover system design. The slopes of this foundation layer for each pond's final cover system will be steep enough to prevent storm water from ponding over the cap but flat enough to limit erosion caused by the storm water run-off. These slopes will also be designed to accommodate potential settling and subsidence while maintaining a positive drainage strategy. In addition, the foundation layer's slopes (and the final cover system in general) will also include measures that provide slope stability to prevent the sloughing or movement of the final cover system during the closure and post-closure care period. Finally, the foundation layer surface will be prepared such that it is free from large, protruding, or sharp materials that could otherwise cause damage to the overlying low permeability layer.

3.2 LOW PERMEABILITY LAYER

Illinois CCR Rule References: 35 Ill. Adm. Code 845.750(a)(1) & 845.750(c)(1)

Federal CCR Rule References: 40 CFR 257.102(d)(1)(i) & 257.102(d)(3)(ii)(A)

The structured geomembrane component of the ClosureTurf® system will be placed on top of the graded CCR (and structural fill if necessary) in South Ash Ponds 2 and 3 to minimize the infiltration of precipitation through each pond during their post-closure lives. This low permeability layer will control stormwater run-off from the final cover system and will minimize (1) post-closure infiltration of storm water into the waste and (2) releases of CCR, leachate, or contaminated run-off to the ground or surface waters or to the atmosphere.

Table 1 compares the Federal and Illinois CCR Rules' design criteria for the low permeability layer of a final cover system installed over a CCR surface impoundment. By inspection, the Illinois CCR Rule's design criteria for the low permeability layer are either as protective or more protective of human health and the environment than the design criteria promulgated by the Federal CCR Rule. Accordingly, the structured geomembrane component of the ClosureTurf® system for South Ash Ponds 2 and 3 will be designed in accordance with the design criteria promulgated by the Illinois CCR Rule for a low permeability layer in a final cover system.

Table 1 – Comparison of Illinois and Federal CCR Rules' Design Criteria for Low Permeability Layer in a CCR Surface Impoundment's Final Cover System

Construction Material	Parameter	Illinois CCR Rule Design Criterion (35 Ill. Adm. Code 845.750(c)(1))	Federal CCR Rule Design Criterion (40 CFR 257.102(d)(3))
Earthen Material	Thickness	3 feet minimum	1.5 feet minimum
	Hydraulic Conductivity	Least of: • Permeability of any bottom liner system or natural subsoils • 1×10^{-7} cm/sec	Least of: • Permeability of any bottom liner system or natural subsoils • 1×10^{-5} cm/sec
	Compaction	Minimize void spaces	--
Geomembrane	Thickness	40 mil	--
	Hydraulic Flux	Equivalent or superior reduction in infiltration as a low permeability layer constructed with earthen material	Equivalent or superior reduction in infiltration as a low permeability layer constructed with earthen material
	Prepared Subgrade	Free from sharp objects and other materials that may cause damage	--

South Ash Ponds 2 and 3 both have a 60-mil HDPE geomembrane liner along their respective floors and sideslopes; therefore, the low permeability layer in each pond's final cover system must have a permeability that is equal to or less than the effective permeability of the existing liner. Accordingly, MWG plans to specify a 60-mil HDPE, structured geomembrane for the ClosureTurf® system installed over each pond pursuant to 35 Ill. Adm. Code 845.750(c)(1)(B) and 40 CFR 257.102(d)(3)(ii)(A).

As required by 35 Ill. Adm. Code 845.750(c)(1)(B)(i) and 40 CFR 257.102(d)(3)(ii)(A), Table 2 demonstrates that a 60-mil HDPE geomembrane will provide a superior reduction in infiltration when compared to a 3-foot-thick layer of earthen material with a hydraulic conductivity of 1×10^{-7} cm/sec. The liquid flow rate through a 3-foot-thick layer of earthen material is calculated using the equation derived from Darcy's Law for gravity flow through porous media that is specified by the Illinois and Federal CCR Rules as the basis for demonstrating compliance with both rules' alternative composite liner design criteria (Ref. 1, §845.400(c)(3); Ref. 2, Eq. 1). Meanwhile, the liquid flow rate through a geomembrane liner is calculated using Bernoulli's equation for free flow through an orifice based on the assumption that one 2-mm-diameter hole is present in the geomembrane for every acre (4,000 m^2) of liner (Ref. 3). Both liquid flow rates calculated in Table 2 are based on the assumption that 5.96 inches (0.15 meter) of hydraulic head is present on the low permeability layer, which is the estimated 25-year, 24-hour precipitation depth at the Station (Ref. 4). This is a conservative assumption because the final cover system will be sloped to preclude the build-up of storm water on the low permeability layer.

Table 2 – Liquid Flow Rate Comparison Between Low Permeability Layers Constructed Using Geomembrane & Earthen Material

Parameter	Symbol	Value
Liquid Flow Rate Through Earthen Material		
Hydraulic Conductivity	k	1×10^{-9} m/sec
Hydraulic Head Above Layer	h	0.15 m
Layer Thickness	t	3 ft = 0.91 m
Hydraulic Gradient Through Earthen Material	$i = h / t$	0.16
Liquid Flow Rate Through Layer per Acre of Final Cover System (Ref. 1, §845.400(c)(3); Ref. 2, Eq. 1).	$q = k \times (i + 1)$	1.16×10^{-9} m^3/sec/m^2
Liquid Flow Rate Through Geomembrane		
Hole Area in Geomembrane	a	3.1 mm^2 / 4000 m^2
Acceleration Due to Gravity	g	9.81 m/sec^2
Hydraulic Head Above Layer	h	0.15 m
Liquid Flow Rate Through Layer per Unit Area (Ref. 3)	$q = 0.6a(2gh)^{0.5}$	7.98×10^{-10} m^3/sec/m^2

3.3 FINAL PROTECTIVE LAYER

Illinois CCR Rule References: 35 Ill. Adm. Code 845.750(c)(2)

Federal CCR Rule Reference: 40 CFR 257.102(d)(3)(ii)(B)

To minimize wind and water erosion, the ClosureTurf® system features an engineered synthetic turf with a thin (0.5- to 0.75-in. thick) layer of specialized sand infill that is installed over the structured geomembrane. The artificial turf component consists of a double-layer, woven geotextile base through which tufts of polyethylene fibers are inserted. This engineered synthetic turf and specialized sand infill will cover the entire structured geomembrane component and will be installed as soon as possible after deployment and welding of the geomembrane.

Research and testing performed by Watershed Geo has demonstrated that ClosureTurf® provides superior protection against wind and water erosion than a traditional final protective layer consisting of vegetated topsoil or other earthen materials (Ref. 5). Specifically, the engineered synthetic turf component has been tested at hurricane-level wind speeds (using a wind tunnel) and at storm rainfall intensities of more than 6 inches per hour. By comparison, the 100-year, 1-hour rainfall depth for Will County, Illinois, where the Station is located, is approximately 3.92 inches (Ref. 4). The most significant rainfall event to date at a site with a

ClosureTurf® cap occurred in 2014 in Pensacola, Florida, where 22 inches of rain fell over 24 hours, and no damage to the final cover system was observed during the inspections that immediately followed the storm event. By comparison, the 100-year, 24-hour rainfall depth for Will County, Illinois is 11.14 inches (Ref. 4), or approximately 51% of the aforementioned 2014 storm event in Pensacola, Florida.

The aforementioned wind tunnel testing conducted on ClosureTurf® at hurricane-level wind speeds by Watershed Geo has also demonstrated that the 0.5- to 0.75-in.-thick, specialized sand infill layer provides enough weight to prevent wind from lifting the ClosureTurf® cap and subsequently exposing the underlying CCR to the atmosphere. The hydraulic performance of ClosureTurf® also is not affected by freezing temperatures and freeze-thaw conditions (Ref. 6). Because the final protective layer will consist of synthetic turf, there is no risk of roots penetrating the underlying geomembrane cap. Therefore, the engineered synthetic turf and specialized sand infill components of the proposed ClosureTurf® final cover system for South Ash Ponds 2 and 3 will provide equivalent or superior performance to the 3-foot-thick final protective layer specified in 35 Ill. Adm. Code 845.750(c)(2).

Finally, in addition to providing superior protection against wind and water erosion than a traditional cover system, ClosureTurf® also does not require as much maintenance as a vegetated final protective layer, which needs to be mowed regularly and may need to be reseeded, refertilized, and/or regraded throughout the ponds' post-closure lives.

4.0 ESTIMATED MAXIMUM INVENTORY OF CCR

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.720(a)(1)(D)
Federal CCR Rule Reference: 40 CFR 257.102(b)(1)(iv)

Detailed records of the maximum inventories of CCR ever stored in South Ash Ponds 2 and 3 are not available. For the purposes of this closure plan, the maximum CCR inventories for South Ash Ponds 2 and 3 are conservatively based on their estimated maximum capacities, which are 21,300 and 24,400 cubic yards, respectively.

5.0 ESTIMATED COVER SURFACE AREA

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.720(a)(1)(E)
Federal CCR Rule Reference: 40 CFR 257.102(b)(1)(v)

The estimated final cover surface areas for South Ash Ponds 2 and 3 are 2.2 and 2.4 acres, respectively. It is estimated that these areas represent the largest surface areas that will ever require final covers at any point over the ponds' active lives.

6.0 CLOSURE SCHEDULE

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.720(a)(1)(F)
Federal CCR Rule Reference: 40 CFR 257.102(b)(1)(vi)

Closure activities are anticipated to be performed concurrently for both South Ash Ponds 2 and 3 and are estimated to be completed in 2026. Table 3 lists the major milestones necessary for closing both ponds and the expected duration for completing each milestone.

Table 3 – Planning Level Schedule for Closing South Ash Ponds 2 & 3

Activity	Estimated Duration
Prepare Closure Construction Design Documents	Complete
Obtain Closure Construction Permit from Illinois EPA	18 Months
Hire Contractor to Complete Closure Activities in Accordance with Illinois EPA Permit	4 Months
Draw Down Water & Dewater Impounded Ash	4 Months
Grade Dewatered Ash and Place and Grade Structural Fill as Needed	1 Month
Install Final Cover System	1 Month
Submit Closure Report and Certification to Illinois EPA	2 Weeks
Obtain Approval of Closure Report and Certification from Illinois EPA	3 Months
Complete and Certify Closure of South Ash Ponds 2 & 3	--

7.0 AMENDMENTS TO CLOSURE PLAN

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.720(a)(3)
Federal CCR Rule Reference: 40 CFR 257.102(b)(3)

This closure plan will be amended in accordance with 35 Ill. Adm. Code 845.720(a)(3) and 40 CFR 257.102(b)(3) if a change in the operation of either South Ash Pond 2 or South Ash Pond 3 would substantially affect this closure plan or if an unanticipated event necessitates a revision to this closure plan.

Any and all amendments to this closure plan will be certified by a qualified professional engineer registered in the State of Illinois in accordance with 35 Ill. Adm. Code 845.720(a)(4) and 40 CFR 257.102(b)(4).

8.0 COMPLETION OF CLOSURE ACTIVITIES

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.760
Federal CCR Rule Reference: 40 CFR 257.102(f)

Upon completion of all closure activities required by 35 Ill. Adm. Code Part 845 and 40 CFR 257.102(d) and approved by the Illinois EPA in a construction permit, a closure report and a closure certification for South Ash Ponds 2 and 3 will be submitted to the Illinois EPA in accordance with 35 Ill. Adm. Code 845.760(e). The closure report will include (1) the engineering and hydrogeology reports containing any monitoring well completion reports, boring logs, all construction quality assurance (CQA) reports, certifications, designations of CQA officers-in-absentia required by 35 Ill. Adm. Code 845.290; (2) photographs with time, date, and location information relied upon for documentation of construction activities; (3) a written summary of the closure requirements and completed activities as stated in the closure plan in effect and 35 Ill. Adm. Code Part 845; and (4) any other information relied upon by the qualified professional engineer for certification. Pursuant to 35 Ill. Adm. Code 845.760(e)(2) and 40 CFR 257.102(f)(3), the certification will be prepared by an independent, qualified professional engineer licensed in the State of Illinois and will verify that South Ash Ponds 2 and 3 have been closed in accordance with the closure plan in effect at the time of the closure work, the requirements of 35 Ill. Adm. Code Part 845, and the requirements of 40 CFR 257.102. Finally, within 30 days of the Illinois EPA approving the closure report and closure certification, a notification of completion of closure will be prepared in accordance with 35 Ill. Adm. Code 845.760(f).

9.0 CERTIFICATION

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.720(a)(4)

Federal CCR Rule Reference: 40 CFR 257.102(b)(4)

I certify that:

- This final written closure plan for South Ash Pond 2 and South Ash Pond 3 was prepared by me or under my direct supervision.
- The work was conducted in accordance with the requirements of 35 Ill. Adm. Code Part 845 and with the requirements of 40 CFR 257.102.
- I am a registered professional engineer under the laws of the State of Illinois.

Certified By: Thomas J. Dehlin

Date: July 28, 2023

Seal:

THOMAS J. DEHLIN
062-069314

10.0 REFERENCES

1. Illinois Pollution Control Board. “Standards for Disposal of Coal Combustion Residuals in CCR Surface Impoundments.” 35 Ill. Adm. Code 845. Accessed April 12, 2023.
2. U.S. Environmental Protection Agency. “Standards for Disposal of Coal Combustion Residuals in Landfills and Surface Impoundments.” 40 CFR Part 257 Subpart D. https://www.ecfr.gov/current/title-40/chapter-I/subchapter-I/part-257/subpart-D. Accessed April 12, 2023.
3. Giroud, J.P. and Bonaparte, R. “Leakage through liners Constructed with Geomembranes—Part I. Geomembrane Liners.” *Geotextiles and Geomembranes*. Vol. 8. pp. 27–67. 1989.
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6. Hsuan, Y. *et al*. “Cold Temperatures and Free[ze]-Thaw Cycling Behavior of Geomembranes and Their Seams.” GSI White Paper #28. Geosynthetic Institute. June 17, 2013.

Attachment 7-2 – Closure Alternatives Analysis

KPRG

ENVIRONMENTAL CONSULTATION & REMEDIATION

KPRG and Associates, Inc.

CCR COMPLIANCE
PRELIMINARY CLOSURE ALTERNATIVES ANALYSIS REPORT
WILL COUNTY STATION PONDS 1N, 1S, 2S, AND 3S

Midwest Generation, LLC
Will County Generating Station
529 E. Romeo Road
Romeoville, Illinois 60446

Prepared By: **KPRG and Associates, Inc.**
14665 West Lisbon Road, Suite 1A
Brookfield, WI 53005

July 31, 2023

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ATTACHMENTS

1.0 INTRODUCTION

Midwest Generation, LLC (Midwest Generation) currently operates the coal-fired steam electric generating station, referred to as Will County Station, located in Romeoville, Illinois ("site" or "generating station"). As part of the coal-fired operations and managing the coal combustion residuals (CCR), the station operates two active surface impoundments (Pond 2S and Pond 3S) and previously operated two now inactive surface impoundments (Pond 1N and Pond 1S). Pond 2S and Pond 3S are used as settling ponds to remove CCR from the stations process water that is sluiced into each pond. Pond 3S was taken out of service as of April 11, 2021 and Pond 2S was taken out of service as of June 1, 2022. Ponds 1N and 1S were taken out of service in 2010 with the CCR remaining in place. In 2013, the water in Ponds 1N and 1S was drained, and both ponds were reconfigured so that they could not accumulate liquids. Figure 1 shows the existing site conditions including the locations of the ponds.

As of the date of this report, Midwest Generation has ceased operating the Will County Generating Station and, therefore, has ceased operating Pond 2S. With the ceased operation of Pond 2S, all four ponds at the site are now inactive and will be closed. In accordance with 35 Illinois Administrative Code Part 845.710(b), a Facility (Owner/Operator) is required to initiate and complete a Closure Alternatives Analysis (CAA) prior to selecting a final closure method. This CAA evaluates the closure options for all four ponds.

This Closure Alternatives Analysis is structured to provide the following information:

- The proposed closure alternatives that will be analyzed,
- An analysis of the closure alternatives that meets the requirements set forth in Section 845.710(b)(1) through 845.710(b)(4),
- The results of groundwater contaminant modeling including how the modeled closure alternative will comply with the applicable groundwater protection standards, and
- A description of the fate and transport of contaminants associated with each closure alternative over time, including seasonal variations.

This document presents the results of the closure alternatives analysis for Ponds 1N, 1S, 2S, and 3S that was completed in accordance with 845.710.

2.0 PHYSICAL SITE CONDITIONS

Ponds 1N, 1S, 2S, and 3S are located adjacent to each other on the southwest portion of the station property. The physical properties of the foundation materials in which Ponds 1N, 1S, 2S, and 3S were constructed consist of a fill layer with underlying sandy and gravelly units and some clay. KPRG performed a site investigation in 2005 that consisted of performing soil borings adjacent to the four existing CCR surface impoundments. The borings performed around the ponds show that the site stratigraphy consists of a 1.5-foot to 2.5-foot thick fill layer at the site surface. This surface layer is underlain by a 1-foot thick layer of sand and silt with some gravel, which is underlain by 5 feet of lean clay. The surface layer is underlain by a 3-foot thick layer of sand and gravel with clay and this layer is then underlain by 5 feet of silty clay. Bedrock was generally encountered at approximately 10 feet below ground surface (bgs).

The silty clay is underlain by Silurian Dolomite with an average Rock Quality Designation (RQD) of 94.84%. The RQD from the samples collected with the closest proximity to Ponds 1N, 1S, 2S and 3S is 99.45%. The closest proximity samples are approximately 13 to 15 miles from Pond 2S and Pond 3S. These RQDs were obtained from a study performed by the Illinois Geological Survey in 1991 titled, “Geotechnical Properties of Selected Pleistocene, Silurian, and Ordovician Deposits of Northeastern Illinois”. An RQD greater than 75% is considered good and an RQD greater than 90% is considered excellent. The RQD is a measure that determines the rock quality, which is used as part of the early site evaluation process when determining locations for engineered structures such as power facilities, underground tunnels, and dams. During the early site evaluation process, the RQD is used to determine any potential problems of bearing capacity, settlement, or sliding. The higher the RQD percentage, the more competent the rock and its ability to support structures, resist settlement and prevent sliding.

Based on construction documents available from Harza dated 1979, dikes existed in the area prior to construction of the ponds. During construction, these dikes were raised and widened with compacted fill material. The fill material was placed at the desired height and width and compacted to the extent to prevent erosion. As part of placing the fill material, any unsuitable material identified within the existing foundations was specified to be removed based on the construction drawings.

The interior slopes were originally lined with fill material and shot rock, which is similar to rip rap, and the pond base was originally lined with three layers consisting of a 12-inch Poz-O-Pac layer, a 12-inch fill layer, and another 12-inch Poz-O-Pac layer on top of the fill layer. The interior slopes and base were then covered with a bituminous curing coat. In 2013, Pond 2S’s original upper Poz-O-Pac layer and fill material in the pond base were removed and replaced with a 60-mil HDPE geomembrane liner on the base and interior slopes for Pond 2S. The lower layer of Poz-O-Pac remained. Pond 2S also has a concrete geocell on the sides of the basin. In 2009, Pond 3S’s original upper Poz-O-Pac layer and fill material in the pond base were removed and replaced with a 60-mil HDPE geomembrane liner on the base and interior slopes for Pond 3S. The lower layer of Poz-O-Pac remained. A warning layer was constructed in both Ponds 2S and 3S on top of the HDPE geomembrane liner that consisted of 12 inches of sand-sized material overtopped with 6 inches of crushed stone like material. The interior slopes of Ponds 1N and 1S were originally lined with fill material and shot rock, which is similar to rip rap, and the pond base was originally lined with three layers consisting of a 12-inch Poz-O-Pac layer, a 12-inch fill layer, and another 12-inch Poz-O-Pac layer on top of the fill layer. The interior slopes and base were then covered with a bituminous curing coat.

The side slopes were designed with 3H:1V (horizontal:vertical) interior slopes, with 3H:1V exterior slopes when the outer embankment is the interior slope of the adjacent pond. The exterior embankment of the south slope of Pond 2S was designed with a 2H:1V slope, the exterior embankment of the west slope of Pond 2S and Pond 3S is approximately 3H:1V. The north embankment of Pond 2S does not have an exterior slope because the crest of the embankment is at the same elevation as the ground level going north. The exterior embankment of the north slope of Pond 1N was designed with an approximate 2H:1V slope, the exterior embankment of the west slope of Pond 1N and Pond 1S is approximately 3H:1V. The north embankment of Pond 1S does not have an exterior slope because the crest of the embankment is at the same elevation as the ground level going north.

2.1 Summary of Geology and Hydrogeology

2.1.1 Geology

The physiography of Will County is made up of ground moraines, end moraines, outwash plains, stream terraces, flood plains and bogs. It is in the Till Plaines and Great Lakes Sections of the Central Lowland Province. Near surface soils in the vicinity of the subject impoundment are predominately Romeo Silt Loam and Joliet Silt Loam, both with areas that are frequently flooded. These soils are poorly drained. Organic content ranges from 3 to 5 percent and have a low to negligible accelerated erosion rate, a low to high corrosivity rate and a pH range from slightly acidic to slightly basic (6.1 to 8.4). Surface runoff class is low (Soil Survey of Will County Illinois). Based on the Surficial Geology Map of Romeo Quadrangle (Caron, 2017) the surficial deposits in the vicinity of the subject surface impoundments are identified as disturbed ground, which is generally described as diamicton, sand, gravel, silt and peat as much as 40 feet thick. This disturbed ground is generally interpreted as disturbed land, which includes former gravel pits and major areas of construction.

The general stratigraphy in the area consists of post-glacial alluvium underlain by unconsolidated glacial deposits, which overlay Silurian dolomite. The Silurian dolomite is underlain by the Maquoketa Group, which includes the Scales Shale, which is considered a regional aquitard separating the overlying Silurian dolomite from the deeper Cambro-Ordovician sandstone and limestone aquifers. To evaluate local stratigraphy, water well logs and engineering test boring logs were obtained for water wells and engineering test borings in the vicinity of the Will County Generation Station. The depths of these wells and borings range from 50 feet to 300 feet. The fifteen (15) monitoring wells that were installed in the vicinity of the subject surface impoundments, MW-1 through MW-15, are shown on Figure 1. Based on an evaluation of the monitoring well boring logs, the following general site-specific stratigraphy is defined:

- Fill (approx. 5’ to 10’ thick) – Consisting of a thin layer of sand and gravel roadway followed by brown and black silty clay and silty sand mixed with gravel and crushed dolomite. The fill may include coal, black cinders and slag.

- Silty Sand, Silt and Clay (approx. 1' – 16' thick) – Consisting of gravelly tan to brown silty sand fining downward to gray/greenish mottled silty clays and clay.

- Bedrock – Dolomite bedrock. Top of weathered bedrock is generally encountered between 9 feet and greater than 20 feet below ground surface with depth increasing towards the southwest. It is noted that at monitoring well location MW-12, top of bedrock was not encountered at the terminus of the boring at 20 feet below ground surface.

The Silurian dolomite is divided into four units identified as a weathered bedrock rind, Joliet Formation dolomite, Kankakee Formation dolomite and the Elwood/Wilhelmi dolomite. Beneath the Silurian dolomite is the Ordovician age Maquoketa Group consisting of the Brainard Shale, Fort Atkinson dolomite and the Scales Shale. The Brainard Shale unit is not necessarily regionally continuous; therefore, it may or may not be present beneath the subject site. The Scales Shale unit, however, is extensive and is a recognized regional aquitard, which hydraulically isolates the deeper bedrock aquifers from the shallower Silurian dolomite. Based on the available information, the dolomite bedrock thickness to the top of the Scales Shale beneath the Will County site is approximately 55 feet.

Regional and local studies and investigations document fractures in the Silurian dolomite describing a primary joint set that is vertical and oriented about N52ºE and N40ºW. The N40ºW joints are described as "more distinct". Natural spacing between the joint sets ranges from three (3) to more than 10 feet, and joint apertures are described as less than 1/16th-inch. Bedding plane fractures are also described. Descriptions from various bedrock quarry walls show significant clay infilling of the vertical joints and bedding plane fractures. Evidence of water movement through fractures is interpreted from iron staining and mineralization (primarily calcite, with some pyrite and marcasite).

Silurian dolomite is a calcium-magnesium carbonate rock that includes horizons of cherty (silica) nodules and is documented both regionally and locally to include mineralization along fractures and within vugs. The mineralization includes, but is not limited to calcite (calcium carbonate) and various sulfide minerals such as pyrite, marcasite, etc. As such, the presence of these minerals and associated weathering products can also be expected within the overlying unconsolidated materials.

There are no underground mines beneath the subject CCR surface impoundments.

2.1.2 Hydrogeology

Based on information from the Soil Survey of Will County, the average annual precipitation is approximately 37 inches with about 63% of that total falling between April and October of any given year. The average seasonal snowfall is approximately just over 10 inches.

The nearest surface water bodies are the Des Plaines River and the Chicago Ship and Sanitary Canal (CSSC) respectively located to the west and east of the subject CCR units. There are no drinking water intakes within the segment of river adjacent to the subject site and for that matter on any portion of the Des Plaines River downstream of the site (Meet Your Water – An Introduction to Understanding Drinking Water in Northeastern Illinois, Metropolitan Planning Council, 2017).

Groundwater beneath the subject units occurs under water table conditions. Saturated conditions are generally encountered between eight (8) and 12 feet bgs, depending on the well location, within the lower portion of the above defined silty sand/silt/clay unit and/or bedrock. A review of the hydrograph shows some slight temporal fluctuations with the highest water levels tending to be in the May timeframe and the lowest water levels generally occurring August through October timeframe.

Groundwater flow maps for the four quarters from 3rd quarter 2020 through the 2nd quarter 2021 were provided as part of the initial operating permit applications submitted for Ponds 1N, 1S, 2S, and 3S. The maps include groundwater elevation data from all 15 wells surrounding the surface impoundments. These maps show that groundwater flow is in a westerly direction and this is consistent with historical flow data for the site. The horizontal hydraulic gradient is fairly shallow and ranges from 0.0025 ft/ft to 0.0053 ft/ft. Additional groundwater data is provided in the initial operating permit applications for Ponds 1N, 1S, 2S, and 3S.

Hydraulic conductivity values were initially estimated for monitoring wells MW-1, MW-4, MW-6, MW-7, and MW-9, screened in the carbonate unit, from slug tests completed by Patrick Engineering in 2010. The geometric mean of the data for these wells was approximately 30 feet per day (ft/d; 3.47 x10^{-4} ft/sec) for each well, as calculated by Patrick Engineering Hydrogeologic Assessment Report – Will County Station, February 2011. The slug test data were reviewed as part of the modeling study being completed for the Construction Permit application and the data were reanalyzed using corrected input values for the well casing and borehole dimensions, effective porosity of the sand filter pack material and minor line fitting refinement. The revised geometric mean of the test data for these wells decreased to approximately 20 ft/d (2.31x10^{-4} ft/sec) for each well. The estimated effective porosity of the aquifer materials (0.2) was obtained from literature (Applied Hydrogeology, Fetter, 1980).

At this time, based on the geology discussion in Section 2.1.1 and the site-specific hydrogeology discussions above, the groundwater beneath the CCR surface impoundment is considered as Class I Potable Resource Groundwater in accordance with Section 620.210. However, a Groundwater Management Zone (GMZ) in accordance with Section 620.250 and an Environmental Land Use Control (ELUC) were established where the CCR surface impoundments are located as part of a Compliance Commitment Agreement (CCA) between Midwest Generation and Illinois EPA. The ELUC states that the groundwater shall not be used as potable water.

A survey of all potable water sources within a 2,500 feet radius of the Will County Generating Station was completed by Natural Resources Technology (NRT) in 2009. The following databases and sources of information were utilized in order to determine community water source and water well locations and construction near the ash pond wastewater treatment systems:

- Illinois State Geological Survey (ISGS) -Water Well Database Query;

- Illinois State Water Survey (ISWS) Private Well Database and water well construction report request; and

- Illinois Division of Public Water Supply web-based Geographic System (GIS) files.

As part of the operating permit application preparation, KPRG evaluated the NRT information and reviewed the new Illinois State Geological Survey database and interactive map references as "ILWATER". There are no potable use water wells downgradient of Pond 1N, Pond 1S, Pond 2S and Pond 3S. There are three existing water wells on the Will County Station property owned by Midwest Generation. These are identified as well numbers 01276, 00253 and 01275. The locations of these wells have been corrected relative to their locations plotted on the ILWATER map. All three wells are greater than 1,500 feet deep. Well 01276 on the north end of the property is no longer in use (retired). Two additional wells located on the property shown as numbers 40018 and 40017 have no backup records (i.e., no installation date information and no depth/log information). Discussions with plant personnel indicate no presence or knowledge of these two additional wells beyond the three known wells (wells 01276, 00253, 01275) suggesting these may be spurious data inputs. The well located on the northeast side of the property (number 40016) within the coal storage pile area is registered to Chicks Romeo Tavern and is actually located approximately 1 mile to the west of the Will County Station along Romeo Road (715 W. Romeo Rd.). There are two wells owned by Isle Ala Cache Park/Museum to the northwest, on the other side of the Des Plaines River, which is a regional hydrogeologic boundary. The well noted to the south (number 41780) is associated with the cement operation to the south.

A search of the Illinois Department of Natural Resources dedicated nature preserve database (https://www2.illinois.gov/dnr/INPC/Pages/NaturePreserveDirectory.aspx) was performed to determine whether there may be a nearby-dedicated nature preserve. The Romeoville Prairie Nature Preserve is located west of the Des Plaines River and north of Romeo Road, approximately one-quarter mile northwest of the subject impoundments. It is noted that the Des Plaines River is a hydrogeologic barrier and the noted nature preserve is on the other side of the river and upstream relative to surface water flow of the river.

Based on the geology of the site presented above and the above hydrogeology discussions, the primary contaminant migration pathway for a potential release from the subject CCR surface impoundments would be downward migration to groundwater. Due to its proximity to the Des Plaines River, which is the adjacent hydrogeologic flow boundary, minimal to no downward vertical flow mixing is anticipated. There are no other utility or man-made preferential pathway corridors that would act to potentially intercept the flow to move any contamination in a direction other than to the west. There are no potable water wells downgradient of the subject CCR surface impoundments screened within the aquifer of concern. Also, as previously discussed, there are no potable surface water intakes on the Des Plaines River either along or downstream of the subject site.

There is quarterly groundwater quality data associated with Pond 1N, Pond 1S, Pond 2S, and Pond 3S dating back to December 2010. However, the parameter list established in 2010 was slightly different from that specified in Section 845.600 and included analysis of dissolved inorganic parameters rather than total inorganic parameters.

Pond 2S and Pond 3S were identified as being subject to the new federal requirements under Federal Register, Environmental Protection Agency, 40 CFR Parts 257.94, Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities; Final Rule dated April 17, 2015 (Federal CCR Rule). As required under the Federal CCR Rule, eight rounds of background sampling were completed for the monitoring wells within the monitoring network for the subject CCR surface impoundments (MW-5, MW-6 and MW-9 through MW-12). This included the full list of Appendix III (detection monitoring) and IV (assessment monitoring) parameters. Subsequently, quarterly groundwater monitoring for the first two years, followed by semi-annual groundwater monitoring, of these wells was continued for only Appendix III detection monitoring parameters since there were no detections of Appendix III parameters above the established statistical background for those wells and/or an Alternate Source Demonstration (ASD) was completed indicating a source of impacts other than the subject surface impoundments. Since the effective date of the State CCR Rule, quarterly groundwater monitoring for the full list of parameters specified in 845.600, which includes all parameters in the Federal CCR Rule Appendix III/IV, has continued. This data is available in the stations Initial Operating Permit application. In addition, it is noted that Illinois EPA added turbidity measurements to the list with a required eight rounds of background of that parameter for each well in the monitoring network for the subject CCR surface impoundments.

Because Pond 1N and Pond 1S did not accumulate liquids, they were not identified as being subject to the federal requirements under Federal Register, Environmental Protection Agency, 40 CFR Parts 257.94, Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities; Final Rule dated April 17, 2015 (Federal CCR Rule). Therefore, the required eight rounds of background sampling for monitoring wells associated with these two ponds (wells MW-1 through MW-4, MW-7, MW-8 and MW-13 through MW-15) were completed between April 2021 and December 2021 with the enactment of the State CCR Rule. There is additional background sampling data starting in 2015 for monitoring well MW-9 since this well is also part of the Ponds 2S/3S monitoring system, which were included in the Federal CCR Rule program. As required under the State CCR Rule, all samples collected were analyzed for the full list of parameters specified in 845.600(a)(1) plus calcium and turbidity. The available CCR monitoring data through 2021 is available in the station’s Initial Operating Permit application.

3.0 IDENTIFICATION OF CLOSURE ALTERNATIVES

The Will County Generating Station has ceased operations and Ponds 1N, 1S, 2S, and 3S are now considered inactive CCR surface impoundments and subject to the State CCR Rule 35 Ill. Adm. Code Part 845. The ponds will be closed as part of decommissioning the generating station. Closure of the ponds must be completed either by leaving the CCR in place and installing a final cover system or through removal of the CCR and decontamination of the CCR surface impoundment, as described in Sections 845.720 through 845.760. Prior to selecting a closure method, a closure alternatives analysis must be completed in accordance with the requirements of 845.710.

The closure alternatives evaluated in accordance with Sections 845.710(b) through 845.710(d) are as follows:

- Closure Alternative 1: Complete removal of CCR including alternative modes of transporting the CCR in accordance with Sections 845.710(c) and 845.740.
- Closure Alternative 2: Leave the CCR in place in each pond and install a final cover system.
- Closure Alternative 3: Leave the CCR in place and perform in-situ soil stabilization.
- Closure Alternative 4: Consolidate the CCR and install a final cover system.

A brief description of each closure alternative is presented below.

3.1 Closure Alternative 1: Complete Closure by Removal

The ponds were used to temporarily contain CCR removed from the boilers and dewater the CCR before it is hauled offsite for permanent disposal. Typically, one pond was used at a time until it reached its storage capacity, then a different pond would be used. Ponds 1N and 1S were used to manage CCR when the station operated Generating Units 1 and 2. Ponds 2S and 3S were used to manage CCR for the most recently operated Generating Units 3 and 4. Generating Units 1 and 2 were retired and Ponds 1N and 1S were retired in 2010. Ponds 2S and 3S were used to manage CCR for Generating Units 3 and 4. Pond 3S ceased receiving CCR as of April 11, 2021 and Pond 2S ceased receiving CCR as of June 1, 2022.

The extent of the CCR in all four ponds was determined using a topographical survey from 2022, the original design drawings, and the as-built drawings for the Ponds 2S and 3S liner replacement. The CCR in Pond 1N ranges from the ground surface (590 ft amsl to 591 ft amsl) to 7.5-8.5 feet below ground surface (bgs) (582.5 ft amsl). The CCR in Pond 1S ranges from the ground surface (590 ft amsl to 591 ft amsl) to 7.5-8.5 feet bgs (582.5 ft amsl). The CCR in Pond 2S ranges from the ground surface (590 ft amsl to 591 ft amsl) to 7-8 feet bgs (583 ft amsl). The CCR in Pond 3S ranges from the ground surface (590 ft amsl to 591 ft amsl) to 7.7-8.7 feet bgs (582.3 ft amsl).

As stated in 845.740(a), closure by removal consists of removing all CCR and decontaminating all areas affected by releases of CCR from the CCR surface impoundment. CCR removal and decontamination of the CCR surface impoundment are complete when all CCR and CCR residues, containment system components such as the impoundment liner and contaminated subsoils, and CCR impoundment structures and ancillary equipment have been removed. To execute closure by removal of Pond 1N, 1S, 2S, and 3S, the following activities would occur:

- Dewater any standing water in Ponds 2S and 3S, which should be only stormwater at this point. Pond 1N and 1S do not contain standing water;
- Install erosion control measures, prior to earthwork;
- Excavate and stage CCR to allow for additional dewatering, as necessary;
- Load the CCR into haul trucks and transport for off-site disposal;
- Remove geomembrane liner and demolish concrete outlet structures.

The estimated quantity of CCR material that would require excavation from Pond 1N is 28,700 CY; Pond 1S is 30,300 CY; Pond 2S is 32,000 CY; and Pond 3S is 32,600 CY, which totals 123,600 CY. The volumes are based on the bank/in-place CCR quantity based upon the existing site elevations, the estimated depth of the CCR material based on the December 2022 topographic survey and the original design drawings of the ponds. The estimated quantities include the total quantity of the original Poz-O-Pac liners that remain in all four ponds. The estimated quantity for Pond 1S includes the north portion of the embankment that separates Ponds 1S and 2S. The estimated CCR quantity for Ponds 2S and 3S includes the total quantity of the warning layer because it is anticipated that IEPA will require the warning layer be included as CCR material, the south portion of the embankment that separates Pond 1S and 2S, and the embankment that separates Ponds 2S and 3S. If any portion of the warning layer is not considered as CCR material, then it will be used as part of the base material installed to assist with stormwater drainage from the excavated ponds. The extent of the removal areas and post-excavation contours are shown on Figure 2. As the bank/in-place material is removed, it may be stockpiled and staged as necessary to allow for any additional dewatering from the CCR prior to it being loaded and transported offsite. As the CCR is excavated, it is expected to swell by approximately 30%, which creates a handling and transportation volume for Pond 1N of 37,310 CY; Pond 1S - 39,390 CY; Pond 2S - 41,600 CY; and Pond 3S - 42,380 CY.

Ponds 1N and 1S have the original Poz-O-Pac liner system and Pond 2S and 3S have a 40-mil geomembrane liner on top of part of the original Poz-O-Pac liner system. Ponds 1N and 1S were closed in 2010 after Generating Units 1 and 2 were shutdown. Ponds 2S and 3S were relined in 2013/2014 as part of a Compliance Commitment Agreement between Midwest Generation and the Illinois Environmental Protection Agency. The relining consisted of removing part of the original Poz-O-Pac liner system to achieve a desired elevation, then installing the 40-mil geomembrane liner over top of the remaining Poz-O-Pac. On top of the above liners for each pond are eighteen inches of a warning system consisting of 12 inches of a cushion layer directly on the liner followed by 6 inches of warning layer. The cushion layer and warning layer are anticipated to consist of a sand/small aggregate type of materials.

Some or all of the liner system from each pond will be removed after the CCR material in accordance with 845.740(a). The Poz-O-Pac liner system in Ponds 1N and 1S will be evaluated for potential CCR contamination after the CCR material has been removed from each pond. If it appears the Poz-O-Pac liner surface has been contaminated by CCR material, it will be removed until the liner system no longer visually appears to contain CCR contamination. The removed Poz-O-Pac components will be hauled to the same landfill as the CCR material for disposal. The geomembrane liner in Ponds 2S and 3S will be removed and hauled to the same landfill as the CCR material for disposal. The remaining Poz-O-Pac liner below the geomembrane liner will be visually evaluated for the presence of CCR material, and if observed, the Poz-O-Pac liner would be removed and hauled offsite for landfill disposal.

As part of this scenario, dewatering will be necessary to remove water that may have accumulated in Ponds 2S and 3S to begin CCR removal. As needed, dewatering will occur if precipitation accumulates during the removal of the CCR material. The dewatered water would be pumped into the outlet structure for the respective pond where it would discharge through the existing drainage and NPDES system. Dewatering is not required for Ponds 1N and 1S prior to CCR removal because precipitation drains into the existing outlet structures. As CCR material is removed from Ponds 1N and 1S, accumulated precipitation may occur and would require dewatering. Detailed cost estimates in accordance with Section 845.710(d)(1) are provided in Table 4. The cost for closure by removal uses Laraway Recycling and Disposal Facility as the disposal facility; however, no discussions for disposal at this facility have occurred at this time.

Fill material is necessary to be placed in the bottom of the removal excavation after the removal activities have occurred. This fill material is necessary to create a sloped bottom so stormwater will drain from the bottom of this excavation into the existing process water drainage and recirculation system. Approximately 40,000 CY of fill material is necessary to achieve the necessary slopes to ensure drainage will occur.

As part of closure by removal as required by 845.740(b), groundwater monitoring must continue for three (3) years or for three years after groundwater monitoring does not show an exceedance of the groundwater protection standard established under 845.600, whichever is longer. A discussion of this closure alternative option relative to established evaluation criteria is provided in Section 4.0.

3.1.1 Availability of Nearby Landfill Space

As stated above, closure by removal and disposal at an existing off-site landfill will require dewatering, excavation, loading, transportation, and disposal of an estimated combined 161,000 CY of CCR from Pond 1N (37,310 CY), Pond 1S (39,390 CY), Pond 2S (41,600 CY), and Pond 3S (42,380 CY). There are four (4) landfills in the northeast region of Illinois and they are all within 75 miles of the Will County station, 1) Laraway Recycling and Disposal Facility, 2) Prairie View Recycling and Disposal Facility, 3) Countryside Landfill, Inc., and 4) Zion Landfill.

Laraway Recycling and Disposal Facility (Laraway RDF) is approximately 16 miles from the station and the closest of the three identified landfills. Prairie View Recycling and Disposal Facility (Prairie View RDF) is approximately 36 miles and the second closest landfill, Countryside Landfill, Inc. is approximately 56 miles from the station, and Zion Landfill is approximately 75 miles from the station. In regards to the closure by removal scenario and off-site disposal of CCR, the available landfill capacity based on IEPA's 2021 Landfill Capacity Report at each facility is as follows:

- Laraway Recycling and Disposal Facility – 5,405,667 CY with 4 years of life expectancy based on the current disposal rate.

- Prairie View Recycling and Disposal Facility – 13,167,434 CY with 16 years of life expectancy based on the current disposal rate.

- Countryside Landfill, Inc. – 1,516,739 CY with 4 years of life expectancy based on the current disposal rate.

- Zion Landfill – 4,573,014 CY with 7 years of life expectancy based on the current disposal rate.

Waste Management operates Laraway RDF, which accepts municipal waste, clean/contaminated soils, construction & demolition debris, and other wastes. This landfill does not accept hazardous waste. As noted above the amount of material that would require disposal is 161,000 CY and the capacity of the landfill is approximately 5.4 million CY, which is enough capacity to contain the amount of CCR requiring disposal. Access to this landfill would require truck traffic on county/state highways and local township roads. Laraway RDF has only five years of lifetime capacity remaining and limited ability to accept new waste because of existing contractual obligations. KPRG reached out to the landfill to request their potential acceptance of the CCR material and acceptance is unlikely because of the existing contractual obligations and regulatory limits on CCR waste acceptance.

Waste Management operates Prairie View, which accepts municipal solid waste, contaminated soil, construction & demolition debris, and other wastes from sixteen (16) counties around the area. This landfill does not accept hazardous waste. As noted above, the amount of material that would require disposal is 161,000 CY and the capacity of the landfill is approximately 13.1 million CY, which is enough capacity to contain the amount of CCR requiring disposal. Prairie View has contractual obligations with existing entities and has limited ability to take on new sources of waste. KPRG reached out to the landfill to request their potential acceptance of the CCR material. The landfill, in general, does accept CCR material but there are concerns over the interaction of the CCR with the municipal solid waste in the landfill.

Waste Management operates Countryside Landfill, Inc., which accepts municipal waste, clean/contaminated soils, construction & demolition debris, and other wastes. This landfill does not accept hazardous waste. As noted above the amount of material that would require disposal is 161,000 CY and the capacity of the landfill is approximately 1.5 million CY, which is enough to contain the amount of CCR requiring disposal. This landfills five-year average disposal volume is 371,346 CY and the disposal quantity is 161,000 CY, which is over forty percent of the yearly volume. In addition, this landfill is 56 miles from the Will County station, which creates a long turn-around time for each truck and decreases the loads per day that can be disposed of along with the increased emissions from so many miles being driven. Therefore, this landfill is not a practical option for disposal of CCR from the ponds.

GFL Environmental, Inc. operates Zion Landfill, which accepts municipal waste, contaminated soils, and special waste. This landfill does not accept hazardous waste. As noted above the amount of material that would require disposal is 161,000 CY and the capacity of the landfill is approximately 4.5 million CY, which is enough to contain the amount of CCR requiring disposal. Access to this landfill would require truck traffic on county/state highways and local township roads. In addition, this landfill is 56 miles from the Will County station, which creates a long turn-around time for each truck and decreases the loads per day that can be disposed of along with the increased emissions from so many miles being driven. Because of the distance this landfill is from the station, it is not a practical option for disposal of CCR from the ponds.

It should be noted that adverse reactions could occur between CCR and municipal solid waste causing elevated temperatures. Elevated temperatures may cause compliance issues for the landfill such as odors, air emissions, changes in leachate quality and adverse settlement. It is because of these concerns that landfills may place limits on how much CCR they accept or may not accept any CCR at all.

3.1.2 Modes of Transport

As required by 845.710(c)(1), this closure by removal analysis includes evaluating whether the CCR can be transported from the site for disposal by rail, barge, low-polluting trucks, or some combination of these transportation modes. These are discussed below.

3.1.2.1 Rail Transport

The site currently has railroad access that runs adjacent to Ponds 1N, 1S, 2S and 3S that was used to deliver coal to the station. The site coal delivery system is located near the northeast corner of Pond 1N, which unloaded the coal from the rail cars, and the coal was then transported to the coal yard, located in the northeast corner of the property, using a conveyor system. The coal delivery system was only designed to unload coal from the rail cars and store on site, but not designed to load the rail cars. The existing rail car coal unloading system is contained indoors within a building. In order to load rail cars, a new permanent system would have to be designed and constructed or existing commercially available equipment would need to be evaluated to determine if a temporary loading system could be erected. In the event a temporary loading system could be erected, the closest landfill to the site is Laraway RDF and its location was evaluated in relation to the railroad system and the Will County station. The location of the railroad that travels from the vicinity of the Will County station does not go directly to Laraway RDF, but the rail system travels from the Will County station to Midwest Generation's Joliet #9 generating station, which has a system that unloads rail cars. Theoretically, this system could be used to unload the CCR, which could be loaded into trucks and hauled to Laraway RDF, which is approximately 5 miles from the Joliet #9 station. In 2016, the Joliet #9 station was converted from coal to natural gas. Since the station ceased coal-handling operations, the rail car unloading system has been completely decommissioned and is no longer operational. A substantial amount of work would be necessary to make this system operational, which includes the following:

- Reconstructing the power system. The system that powered the unloading equipment was disconnected at the power source from the electrical utility company so the entire infrastructure would need to be installed that provided power from the utility's electrical grid to the unloading system controls. This would also include reinstalling the appropriate transformers.

- Replacing all the systems conveyor belts, which are at least 150 feet in length.
- Renting or purchasing new handling equipment to move the material after it has been unloaded.
- Completing an engineering review to determine the systems' structural viability and making any necessary structural repairs.
- Re-hiring or hiring new personnel to operate this system because the previous personnel have now left Midwest Generation since the station has ceased coal-handling operations.

Executing the above listed tasks is estimated to cost in excess of $500,000 in addition to the costs associated with constructing a temporary rail car loading system at the Will County station, removing the CCR from the ponds, and loading the CCR onto trucks that will haul it to the landfill. The railroad in the area of Laraway RDF travels adjacent to the Des Plaines River and not near the landfill. There are railroad spurs off of the main line that enter into the Union Pacific railyard along with the Zenith-Energy Joliet Terminal, which are capable of unloading railcars but not the type of railcar that would be used to haul the CCR material. It is also unlikely these companies would accommodate the unloading of CCR railcars without additional expense to modify their onsite equipment. The railroad does travel within 2 miles of Prairie View RDF, but a specific unloading station would need to be constructed along with purchasing property for this. From this point, the CCR would still need to be loaded onto dump trucks and driven to the landfill. The issue of needing an unloading location also exists for Countryside Landfill and Zion Landfill, which are located approximately 1 mile and 3 miles from a railroad line, respectively. The expense associated with this is not justifiable based on a CCR quantity of only 161,000 CY and the fact this would be a one-time event. Transporting the CCR by rail is not a viable option because of the logistics necessary to use the rail system to load, unload, and transport the CCR.

3.1.2.2 Barge Transport

The Will County station is sandwiched between the Des Plaines River and the Chicago Sanitary and Ship Canal (CSSC). The east side of the station is designed to allow a barge to dock and unload coal. A conveyor system is present along the east side to unload coal from a barge and place it in the coal yard. It may be possible to use this existing system to load CCR onto a barge for transport. Laraway RDF and Prairie View RDF are the only landfills that are located near any major river that would be able to accommodate barge traffic. Laraway RDF is near the Des Plaines River, which is less than one-half mile away. Prairie View RDF is near the Kankakee River, which is approximately 3-4 miles away, but no obvious barge port is present. A barge terminal and conveyor system is located at the Port of Will County Barge Terminal, which is owned by CenterPoint Properties. The terminal consists of a barge terminal and conveyor system for the movement and storage of materials. This terminal is approximately two miles from Laraway RDF and approximately 16 miles from Prairie View RDF. The Port of Joliet is located approximately five miles from Laraway RDF and 15-16 miles from Prairie View RDF, which could be an alternative barge terminal. Neither river enters the landfills; therefore, the CCR material would still need to be off loaded from the barge and loaded onto a truck for final disposal in the landfill. If the existing barge terminals can be used to unload CCR material, agreements would be needed between the barge terminal operators and Midwest Generation, along with payment for using the facilities. If the existing barge terminals cannot be used, then unloading facilities would need to be constructed at the end of the barge trip. Not only will this require time for permitting, but also access agreements would be needed with landowners that may be unwilling to agree. If an agreement can be arranged to use the existing barge terminals to unload CCR material, then transpiration via barge may be a viable option. If the existing barge terminals cannot be used, then transporting the CCR via barge is not a viable transportation option.

3.1.2.3 <u>New On-Site Landfill</u>

As required by 845.710(c)(2), this closure by removal analysis includes identifying whether an on-site landfill is present on the property or if an on-site landfill could be constructed. The Will County station property does not have an existing onsite landfill, but the existing site has the land available to construct a new on-site landfill. Based on the quantity of 161,000 CY an area up to approximately 540,000 square feet (12.4 acres) would be required to construct a new on-site landfill. Because of the site elevations (590-592 ft amsl), the anticipated groundwater elevation (578-582 ft amsl) in the coal pile area, and the five-feet separation requirement, the landfill would need to be constructed from the ground surface up. The base of the landfill would be from the site elevation of 590-592 ft amsl and the embankments would extend up to a crest elevation of 602 ft amsl based on a surface area of 540,000 square feet. The berms must be constructed as a perimeter to contain the CCR. If the landfill embankments were taller, then the footprint of the landfill would diminish.

The 12.4 acres is only the space required for CCR storage, additional land would be needed for property line setbacks, the leachate collection equipment, access roads, groundwater monitoring network, and other necessary equipment. Because of the groundwater elevation, any landfill would be constructed at ground elevation, which means any portion of the landfill, would extend above ground at least 10 feet and up to 15 feet to allow for the necessary space for the CCR and the final cover construction. The only areas at the Will County station where a landfill could be constructed are the former coal pile area or the green space to the southeast. The former coal pile area (northeast area) is not acceptable for a landfill because two of the stations water supply wells are located nearby. The green space area to the southeast of the ponds would have enough space if the tanks and silos in the southeast corner of the site were demolished. This would add to the cost of constructing the landfill along with obtaining additional demolition permits.

Constructing an onsite landfill would require obtaining the necessary permits and conducting the siting process. The siting process requires local approval and a public meeting. This process can take many years (estimated at 3-5 years) based on permitting requirements, any zoning changes, design requirements, and obtaining the necessary local approvals. The presence of an onsite landfill may make the property less desirable for resale and the City of Romeoville may not allow the construction of a landfill because it does not agree with their land use plan. The cover that would be placed over the CCR in a new landfill is the same cover that would be placed over the CCR closed in place in the ponds. In addition, Ponds 1N and 1S have the existing Poz-O-Pac liner that assists in preventing precipitation from passing through the pond into the subsurface. The liners in Pond 2S and 3S were replaced in 2013/2014 with a 60-mil HDPE geomembrane, which has a permeability of no greater than 10^{-9} cm/s.

It is unlikely the current Will County Station property is adequate to construct a new on-site landfill; adjacent parcels that could potentially be purchased were also evaluated. The land west of the station is the Des Plaines River, the land to the east is the CSSC, the land beyond the CSSC is in a floodplain, and the properties to the north and south are developed and in a floodplain. The adjacent properties are not viable options for a new landfill. If a nearby property could be located, it is unlikely it is a viable option to construct a landfill. First, the sale of the property is not certain. Second, the construction of a new landfill includes the sitting process, which requires local approval and local approval is not guaranteed. In addition, the smaller quantity of material that requires disposal and the fact it is a one-time disposal event, does not justify the time and expense of sitting and constructing a new landfill.

3.2 Closure Alternative 2: Closure in Place with a Final Cover System

The closure in place with a final cover system (FCS) alternative would consist of leaving the CCR in place in Ponds 1N, 1S, 2S, and 3S, placing additional fill material (as needed), and covering with a final cover system in accordance with 845.750. The final cover system would consist of a geomembrane low permeability layer, which is topped with an alternative final protective layer that provides equivalent performance to a soil final protective layer. The FCS would be sloped to allow for precipitation to runoff and drain into each ponds existing discharge structure, which enters the water recirculation system. The water is discharged to the CSSC through the permitted outfall in compliance with the existing NPDES permit.

The FCS product that would be used is the proprietary ClosureTurf cover system created by Watershed Geo. The ClosureTurf FCS consists of a geomembrane low permeability layer that also incorporates a drainage layer. The final protective layer is replaced with engineered synthetic turf that is infilled with sand/small aggregate to provide ballast to the synthetic turf. The infiltration layer will be a 60-mil HDPE geomembrane with a hydraulic conductivity that is no greater than $1x10^{-7}$ cm/sec. The engineered synthetic turf is comprised of polyethylene fibers that are tufted through a double layer of woven geotextiles that are highly UV and heat resistant. The engineered synthetic turf is then infilled with small aggregate that is approximately 1/8 inch to 1/4 inch diameter in size. The small aggregate is brushed into the synthetic turf to ensure that it settles to the bottom of the turf, which provides ballast and prevents the turf's movement during wind events.

Pond 1N has a crest embankment elevation that ranges between 590 and 591 ft amsl, a bottom elevation of approximately 582.5 ft amsl, and the discharge structure has a weir elevation of approximately 589 ft amsl. Pond 1N has an outer concrete wall that is part of the discharge structure, which has an average elevation of 593.4 ft amsl. The majority of the CCR in Pond 1N has an approximate elevation of 588-589 ft amsl with the east edge of the CCR at an elevation of 590 ft amsl. The southwest corner of Pond 1N has CCR elevation that range from 588 ft amsl to 583 ft amsl to allow for any precipitation that flows towards this corner to drain out of the pond into the existing drainage structure. The existing CCR material will be graded to slope towards the existing drainage structure to allow drainage to prevent the accumulation of precipitation. It may be necessary to add addition fill material to achieve the desired grade elevations. Approximately 100 CY of existing CCR will be graded and 4,910 CY of fill material is required. The ClosureTurf FCS would then be placed on top of the sloped surface with the geomembrane being attached to the discharge structure, the synthetic turf placed on top of the geomembrane, and the turf infilled with sand/small aggregate. The surface of the final protective layer will be sloped towards the Pond 1N discharge structure to allow for drainage.

Pond 1S has a crest embankment elevation that ranges between 590 and 591 ft amsl, a bottom elevation of approximately 582.5 ft amsl and the discharge structure has a weir elevation of approximately 589 ft amsl. Pond 1S has an outer concrete wall that is part of the discharge structure which has an average elevation of 593.4 ft amsl and a concrete wall on the east side that is part of an influent channel that has an average approximate elevation of 591.46 ft amsl. The majority of the CCR in Pond 1S has an approximate elevation of 587-590 ft amsl with the southeast edge of the CCR at an elevation of 591 ft amsl. The northwest corner of Pond 1S has CCR elevations that range from 587 ft amsl to 583.5 ft amsl to allow for any precipitation that flows towards this corner to drain out of the pond into the existing drainage structure. The existing CCR material will be graded to slope towards the existing drainage structure to allow drainage to prevent the accumulation of precipitation. It may be necessary to add addition fill material to achieve the desired grade elevations. Approximately 50 CY of existing CCR will be graded and 3,910 CY of fill material is required. The ClosureTurf FCS would then be placed on top of the sloped surface with the geomembrane being attached to the discharge structure, the synthetic turf placed on top of the geomembrane, and the turf infilled with sand/small aggregate. The surface of the final protective layer will be sloped towards the Pond 1S discharge structure to allow for drainage.

Pond 2S has a crest embankment elevation that ranges between 590 and 591 ft amsl, a bottom elevation of approximately 583 ft amsl and the discharge structure has a weir elevation of approximately 589 ft amsl. Pond 2S has an outer concrete wall that is part of the discharge structure, which has an elevation between 593.4 ft amsl and 593.5 ft amsl. Any CCR in Pond 2S is below the water level in the pond, which is between elevations 588-589 ft amsl and could not be observed or surveyed. Pond 2S will be dewatered to expose the existing CCR to execute the closure in place. The existing CCR material will be graded to slope towards the existing drainage structure to allow drainage to prevent the accumulation of precipitation. It may be necessary to add addition fill material to achieve the desired grade elevations. Approximately 40 CY of existing CCR will be graded and 6,700 CY of fill material is required. The ClosureTurf FCS would then be placed on top of the sloped surface with the geomembrane being attached to the discharge structure, the synthetic turf placed on top of the geomembrane, and the turf infilled with sand/small aggregate. The surface of the final protective layer will be sloped towards the Pond 2S discharge structure to allow for drainage.

Pond 3S has a crest embankment elevation that ranges between 590 and 592 ft amsl, a bottom elevation of approximately 582.3 ft amsl and the discharge structure has a weir elevation of approximately 589 ft amsl. Pond 3S has an outer concrete wall that is part of the discharge structure, which has an average elevation of 593.48 ft amsl. The majority of the CCR in Pond 3S is present along the perimeter of the pond and has an approximate elevation of 588-590 ft amsl with the CCR in the center of the pond being lower with an elevation of 588 ft amsl to less than 584 ft amsl. Water is present in the center of Pond 3S. The existing CCR material will be graded to slope towards the existing drainage structure to allow drainage to prevent the accumulation of precipitation. It may be necessary to add addition fill material to achieve the desired grade elevations. Approximately 230 CY of existing CCR will be graded and 8,300 CY of fill material is required. The ClosureTurf FCS would then be placed on top of the sloped surface with the geomembrane being attached to the discharge structure, the synthetic turf placed on top of the geomembrane, and the turf infilled with sand/small aggregate. The surface of the final protective layer will be sloped towards the Pond 3S discharge structure to allow for drainage.

The soils used in the FCS will consist of clean material sourced from as close to Pond 1N, 1S, 2S, and 3S as possible. It may be necessary to use multiple soil sources. A discussion of this closure alternative option relative to established evaluation criteria is provided in Section 4.0.

3.3 Closure Alternative 3: Closure in Place with Soil Stabilization

The in-situ solidification/stabilization (ISS) treatment would occur for the CCR in all four ponds. The ISS treatment would be completed over an approximate combined area of 287,700 square feet, which consists of Ponds 1S, 2S, and 3S and includes the berms separating these ponds. The ISS would be performed for Pond 1N separately and would be completed over an approximate 88,400 square feet area. This alternative would include the ISS of approximately 84,000 CY of CCR in Ponds 1N, 1S, 2S, and 3S. The ISS would be applied by soil mixing from the top of the CCR to the bottom-most extent of the CCR in the ponds. The ISS treatment range in Ponds 1N, 1S, 2S, and 3S extends from elevation 590-591 ft amsl to elevation 580.5 ft amsl, which consists of a treatment thickness range of 9.5-10.5 feet. The upper one foot of the Poz-O-Pac liner system would be removed in Ponds 1N and Ponds 1S to the fill layer so it can be included in the ISS treatment. This would occur by stockpiling the CCR material within the extent of the pond, removing the Poz-O-Pac and then placing CCR material where the Poz-O-Pac was removed. The geomembrane liners in Ponds 2S and 3S would need to be removed prior to the ISS treatment. This would consist of stockpiling some of the CCR material within the pond extent, removing the geomembrane liner and then placing the stockpiled CCR where the geomembrane was removed. For purposes of this closure alternatives analysis, it is assumed the ISS will be implemented through bucket mixing due to the shallow treatment thickness range.

ISS treatment consists of adding reagents to physically bind/solidify and/or chemically react/stabilize the CCR, resulting in a solidified or stabilized mass with reduced constituent mobility and leachability. The ISS will isolate the CCR from human contact and from groundwater by encapsulating in a low permeability monolith. Active reagents used in ISS can include pozzolanic compounds such as cement or blast furnace slag to produce a solidified material, reducing contact with groundwater and surface water. Other additives such as bentonite may be included to help lower permeability as needed. The reagents and additives are typically mixed with water to create a flowable and pumpable slurry that is then mixed with the CCR. The effectiveness and reagent mix for solidification/stabilization would need to be evaluated in a treatability study. Samples would be collected from the CCR in the ponds and bench top testing would be performed to determine the proper mix design. It may be necessary to use multiple mix designs to treat the ISS based on site factors.

Performing ISS will result in expansion of the treated CCR. This expansion is typically 10% to 25% of the original treatment volume. Depending on the soil type, the expansion can range from 10% for sandy materials to 25% or more for clayey materials. One such application of ISS to treat sandy silty fill material resulted in ISS swell of up to 40%. Testing during the ISS treatability study and the ISS pilot test will provide an estimate of the ISS swell expected from the CCR. For this closure alternative analysis, the swell volume estimate will be 30% to present a conservative estimate of the cost and volume of ISS. Any generated ISS swell would be used to achieve a slope of the ISS surface to prevent accumulation of precipitation and ponding.

The completed ISS treatment area would be covered with an FCS. The extent of the treatment area requiring additional clean soil is 376,100 square feet and approximately 37,000 CY of excess ISS will be regraded to achieve the necessary grades to prevent ponding water. The FCS would be sloped to allow water to drain towards the perimeter of the ISS treatment area and the ponds existing discharge structures. Conceptually, the cover installation would consist of direct placement of clean fill on the treated ISS area, and then covered with the FCS. The clean fill will be approximately one foot thick, as necessary. The clean fill including the FCS will be graded to ensure positive drainage and minimize ponding and for the purposes of this report, it is assumed the FCS will be ClosureTurf. Material used for the clean fill will consist of material imported from non-contaminated sites and/or sources. It is assumed 10% more material will be required to allow for compaction of the fill to achieve the one-foot thickness. Stockpiles of on-site materials may be used in the FCS cover.

3.4 Closure Alternative 4: Closure in Place by Consolidation with Final Cover System

The closure in place by consolidation with a final cover system (FCS) alternative would consist of leaving the CCR in place in Ponds 1N and 1S, placing the CCR material from Ponds 2S and 3S into Ponds 1N and 1S, and covering that material with a final cover system in accordance with 845.750. The final cover system would consist of a geomembrane low permeability layer, which is topped with an alternative final protective layer that provides equivalent performance to a soil final protective layer. The FCS would be sloped to allow for precipitation to runoff and drain into the existing Pond 1N and 1S discharge structures. The water from the Pond 1N and 1S discharge structures is discharged to the CSSC through the permitted outfall in compliance with the existing NPDES permit.

The FCS product that would be used is the proprietary ClosureTurf cover system created by Watershed Geo. The ClosureTurf FCS consists of a geomembrane low permeability layer that also incorporates a drainage layer. The final protective layer is replaced with engineered synthetic turf that is infilled with sand/small aggregate to provide ballast to the synthetic turf. The infiltration layer will be a 60-mil HDPE geomembrane with a hydraulic conductivity that is no greater than $1x10^{-7}$ cm/sec. The engineered synthetic turf is comprised of polyethylene fibers that are tufted through a double layer of woven geotextiles that are highly UV and heat resistant. The engineered synthetic turf is then infilled with small aggregate that is approximately 1/8 inch to 1/4 inch diameter in size. The small aggregate is brushed into the synthetic turf to ensure that it settles to the bottom of the turf, which provides ballast and prevents the turf’s movement during wind events.

Pond 1N has a crest embankment elevation that ranges between 590 and 591 ft amsl, a bottom elevation of approximately 582.5 ft amsl, and the discharge structure has a weir elevation of approximately 589 ft amsl. Pond 1N has an outer concrete wall that is part of the discharge structure, which has an average elevation of 593.4 ft amsl. The majority of the CCR in Pond 1N has an approximate elevation of 588-589 ft amsl with the east edge of the CCR at an elevation of 590 ft amsl. The southwest corner of Pond 1N has CCR elevation that range from 588 ft amsl to 583 ft amsl to allow for any precipitation that flows towards this corner to drain out of the pond into the existing drainage structure. The existing CCR material from Pond 2S and Pond 3S will be added to Pond 1N and graded to slope towards the existing drainage structure to allow drainage to prevent the accumulation of precipitation. It may be necessary to add additional fill material to achieve the desired grade elevations. Up to 32,000 CY of existing Pond 2S and Pond 3S CCR will be consolidated in Pond 1N. The ClosureTurf FCS would then be placed on top of the sloped surface with the geomembrane being attached to the discharge structure, the synthetic turf placed on top of the geomembrane, and the turf infilled with sand/small aggregate. The surface of the final protective layer will be sloped towards the Pond 1N discharge structure to allow for drainage.

Pond 1S has a crest embankment elevation that ranges between 590 and 591 ft amsl, a bottom elevation of approximately 582.5 ft amsl and the discharge structure has a weir elevation of approximately 589 ft amsl. Pond 1S has an outer concrete wall that is part of the discharge structure which has an average elevation of 593.4 ft amsl and a concrete wall on the east side that is part of an influent channel that has an average approximate elevation of 591.46 ft amsl. The majority of the CCR in Pond 1S has an approximate elevation of 587-590 ft amsl with the southeast edge of the CCR at an elevation of 591 ft amsl. The northwest corner of Pond 1S has CCR elevations that range from 587 ft amsl to 583.5 ft amsl to allow for any precipitation that flows towards this corner to drain out of the pond into the existing drainage structure. The existing CCR material from Pond 2S and 3S that cannot be placed in Pond 1N will be added to Pond 1S and graded to slope towards the existing drainage structure to allow drainage to prevent the accumulation of precipitation. It may be necessary to add addition fill material to achieve the desired grade elevations. Up to 32,600 CY of existing Pond 2S and Pond 3S CCR will be consolidated in Pond 1S. The ClosureTurf FCS would then be placed on top of the sloped surface with the geomembrane being attached to the discharge structure, the synthetic turf placed on top of the geomembrane, and the turf infilled with sand/small aggregate. The surface of the final protective layer will be sloped towards the Pond 1S discharge structure to allow for drainage.

Fill material is necessary to be placed in the bottom of the Pond 2S and 3S removal excavations after the removal activities have occurred. This fill material is necessary to create a sloped bottom so stormwater will drain from the bottom of these excavations into the existing process water drainage and recirculation system. Approximately 19,000 CY of fill material is necessary to achieve the necessary slopes to ensure drainage will occur.

The soils used in the FCS will consist of clean material sourced from as close to Pond 1N and 1S as possible. It may be necessary to use multiple soil sources. A discussion of this closure alternative option relative to established evaluation criteria is provided in Section 4.0.

4.0 CLOSURE ALTERNATIVES EVALUATION CRITERIA

The closure alternatives were evaluated based on requirements under State CCR Rule Part 845.710(b)(1) through 845.710(b)(4). The evaluation criteria consisted of the following:

- Long- and short-term effectiveness and protectiveness, including reliability;
- Effectiveness of controlling future releases;
- Ease or difficulty of Implementation; and
- The degree to which concerns of the community residents are addressed.

Each closure alternative was evaluated using the above criteria and that evaluation is provided in Table 3. The following highlights are provided from that evaluation. Groundwater modeling was performed in accordance with 845.710(d)(2) and 845.710(d)(3) to assist in evaluating the long- and short-term effectiveness of each closure alternative. A discussion of the groundwater modeling and the results are presented in Section 5.

Alternative Closure Scenario 1: Closure by Removal

- Removing the CCR from Pond 1N, 1S, 2S, and 3S would require excavating and hauling 161,000 CY, which would take over 200 days to execute based on 50 truckloads per day and 15 cubic yards per truck (750 CY/day).

- Removing the CCR would remove any remaining amounts of the CCR mass. Groundwater modeling has shown that theoretical impacts to groundwater are reduced by about 80% within 50 years and removing the mass would remove the potential for future contamination.

- Additionally, the truck traffic removing the CCR will negatively affect the neighboring properties, including air quality and noise pollution, since the entrance and egress for the trucking would be directly via E. Romeo Road and E. Material Service Road.

- This option will require at least 3 years of post-closure monitoring.

Alternative Closure Scenario 2: Closure in Place with a Final Cover System

- ClosureTurf has successfully been used around the country to close CCR surface impoundments and landfills.

- The ClosureTurf final cover will require approximately 25,410 CY of clean fill material and more overall truck traffic to and from the site because the ponds have to be filled to achieve the necessary grades and elevations. It will require approximately 35 days to deliver clean fill to the site based on 50 truckloads per day and 15 CY per truck.

- The ClosureTurf and soil infill will cover the CCR, prevent infiltration into the CCR, and prevent any human or animal contact.

- The ClosureTurf option will require 30 years of post-closure monitoring.

- Minimizing infiltration through the existing CCR will prevent future groundwater impacts. Any elevated constituents that have been detected in the groundwater will disperse through the existing groundwater and concentrations will decrease in time.

Alternative Closure Scenario 3: Closure in place with In-Situ Solidification/Stabilization

- ISS is expected to contain and stabilize the CCR and is anticipated to be an adequate and reliable means of reducing the leaching potential of the CCR if it is exposed to groundwater and precipitation.

- Placement and maintenance of the FCS would provide adequate and reliable means of controlling exposures to stabilized CCR.

- ISS and installation of the FCS would result in impacts to the community relative to truck traffic and noise during the construction. However, as materials requiring offsite disposal are minimized, this disturbance would be less than closure by removal.

- Approximately 84,000 in-place CY of CCR, warning layer, and Poz-O-Pac would be treated with ISS.

- The leaching potential of CCR would be irreversibly reduced through ISS. The mobility of CCR into surface water or via flooding (i.e., associated with erosion) would be further reduced by installation of the FCS.

Alternative Closure Scenario 4: Consolidation with Closure in Place

- ClosureTurf has successfully been used around the country to close CCR surface impoundments and landfills.

- The ClosureTurf final cover will require moving approximately 32,000 CY from Pond 2S and 32,600 CY from Pond 3S and placing in Ponds 1N and 1S. The proposed method for moving the material is mechanical excavation and hauling.

- In addition, only 140 CY of clean fill material would be needed to achieve the necessary grades and elevations. It will require approximately 52 days to consolidate CCR in Ponds 1N and 1S based on 50 truckloads per day and 15 CY per truck.

- The ClosureTurf and soil infill will cover the CCR, prevent infiltration into the CCR, and prevent any human or animal contact.

- The ClosureTurf option will require 30 years of post-closure monitoring.

- Removing the CCR from Ponds 2S and 3S, consolidating in Ponds 1N and 1S, and closing in place will minimize future groundwater impacts. Groundwater modeling has shown that existing groundwater impacts will reduce in time with removal and consolidation. Groundwater impacts will reduce approximately 70% over 25 years.

5.0 GROUNDWATER MODELING

This section discusses the results of the groundwater modeling and a description of the fate and transport of each closure alternative over time in accordance with 845.710(d)(2) and 845.710(d)(3). As discussed in the Illinois CCR Compliance Ash Ponds 1 North and 1 South Annual Groundwater Monitoring and Corrective Action Report, and in the Illinois CCR Compliance Ash Ponds 2 South and 3 South Annual Groundwater Monitoring and Corrective Action Report, both dated January 30, 2023, arsenic, calcium, chloride, molybdenum, and sulfate were detected at concentrations above proposed Groundwater Protection Standards during the 4th quarter 2022 sampling in downgradient monitoring wells. These parameters were the focus of predictive modeling comparisons for the various alternatives discussed in the previous sections. It is noted that boron was also added to the above list of parameters to be evaluated since it is a main indicator of potential CCR impacts.

The groundwater flow modeling that was conducted is based on a hypothetical distribution of dissolved contaminants beneath the four ponds, assuming a source at the ponds, to evaluate the potential closure alternatives. To conduct the support modeling a hypothetical unit source with a concentration of “1” was established beneath the ponds and projected forward in time with advection and dispersion to establish an equilibrated distribution of contaminants in groundwater if the ponds were the source. The equilibrated distribution (base case) of the mass was then used as the initial concentrations in the groundwater for model runs to simulate the closure alternatives to evaluate corresponding improvement in groundwater quality from the base case scenario.

The four proposed closure alternatives discussed above were modeled and the results are presented as follows. The figures referenced in this section are from the Will County Groundwater Modeling Report completed in support of CCR regulatory compliance and are located in Attachment 1.

5.1 Closure Alternative 1

This alternative simulated the removal of the CCR from all four ponds. From the initial equilibrated model run (see Figure 16 in Attachment 1), the source was removed from all four ponds and the change in concentrations was modeled over 5-years, 25-years, 50-years, and 100-years; these model runs are shown on Figures 17 and 18 located in Attachment 1. In general, this closure alternative results in the dissolved contaminants being reduced over time in the subsurface beneath the four ponds. Figure 17 shows the relative concentrations downgradient of the ponds are reduced to less than approximately 0.7 within 5 years and reduced to 0.2 or less within 25 years beneath and downgradient from the ponds. Figure 18 shows relative concentrations at 50 years with further reduction occurring beneath and downgradient of the ponds with relative concentrations less than 0.2. By 100 years, the dissolved contaminants are effectively removed from groundwater beneath and downgradient of the ponds, as shown on Figure 18.

5.2 Closure Alternative 2

This alternative simulated the closure-in-place of all four ponds using an FCS. From the initial equilibrated model run (see Figure 16 in Attachment 1), the hypothetical dissolved contaminants remained in the groundwater beneath the ponds and infiltration was simulated at a reduced rate of $1x10^{-15}$ meters per second (m/s), which represents the engineered FCS placed over the four ponds. The change in concentrations was modeled over 5-years, 25-years, 50-years, and 100-years and these model runs are shown on Figures 19 and 20 located in Attachment 1. As shown on Figure 19, within 5 years relative concentrations in the groundwater are reduced to less than 0.7 downgradient of Pond 1N and less than 0.9 downgradient of Pond 1S. Figure 19 also shows relative concentrations have decreased by a change of about 10 percent to less than 0.4 downgradient of Ponds 2S and 3S. Within 25 years relative concentrations have reduced below 0.3 downgradient of Ponds 1N, 2S, and 3S, and below relative concentrations of approximately 0.8 downgradient of Pond 1S as shown on Figure 19. Figure 20 shows relative concentrations are mostly stable after 25 years with little change at years 50 and 100 with relative concentrations mostly at 0.4 or less downgradient of the ponds.

5.3 Closure Alternative 3

This alternative simulated the ISS treatment of the CCR in the ponds along with the placement of an FCS. As in Closure Alternative 2, the hypothetical dissolved contaminants remained in the groundwater beneath the ponds and infiltration was simulated at a reduced rate of $1x10^{-13}$ centimeters per second (cm/s), which represents the engineered FCS placed over the four ponds. The reduced permeability caused by the ISS treatment was simulated with a horizontal flow barrier around the ISS treatment area with a permeability of $1x10^{-7}$ cm/s. Figure 22 shows that by 5 years, relative concentrations have decreased downgradient of Ponds 1N and 1S to less than approximately 0.6, to less than approximately 0.8 downgradient of Pond 2S, and to less than approximately 0.4 downgradient of Pond 3S. By 25 years, the dissolved mass is mostly confined to the pond footprints, where the source is encapsulated by the ISS treatment. Relative concentrations less than approximately 0.1 to 0.2 remain downgradient of Ponds 1N and 3S as shown on Figure 22. There is little change to the downgradient dissolved mass by 50 years, and by 100 years, the dissolved mass is effectively removed from the groundwater downgradient of the Ponds as shown on Figure 23.

5.4 Closure Alternative 4

This alternative simulated the removal of CCR from Ponds 2S and 3S, which is then placed into Ponds 1N and 1S followed by closure-in-place of the CCR in Ponds 1N and 1S using an FCS. In this alternative, the dissolved contaminants were removed from beneath Ponds 2S and 3S with infiltration remaining at natural conditions. The dissolved contaminants remained beneath Ponds 1N and 1S with infiltration simulated at a reduced rate of 1x10-13 centimeters per second (cm/s), which represents the engineered FCS placed over Ponds 1N and 1S. Figure 24 shows relative concentrations have decreased below 0.3 downgradient of Pond 1N and 1S and relative concentrations are below 0.1 in the groundwater downgradient of Ponds 2S and 3S. By 50 years, the dissolved contaminants are effectively removed from the groundwater downgradient of Ponds 2S and 3S as shown on Figure 25. Relative concentrations in shallow groundwater downgradient of Ponds 1N and 1S have mostly stabilized by 50 years to less than 0.3 and have not reduced further within 100 years as Figure 25 indicates.

5.5 Relation to Constituent Concentrations

The following section is from the Will County Groundwater Modeling Report created by BAS Groundwater Consulting, Inc. This section discusses how the above performed groundwater modeling and the effectiveness of each closure alternative was applied to specific constituents detected in downgradient monitoring wells. The figures referenced in this section are located in Attachment 1. The effective reductions in the theoretical mass concentrations discussed in Sections 5.1 through 5.4 for the four closure alternatives were related to the concentrations of several CCR constituents being monitored in groundwater that were detected at concentrations above their proposed Groundwater Protection Standards (GWPSs) during the 4th quarter 2022 groundwater monitoring event. Specifically, these were arsenic, boron, calcium, chloride, molybdenum, and sulfate. The concentrations of these constituents from the 4th quarter 2022 monitoring in downgradient monitoring wells were used as the starting concentrations for this evaluation. The percent decrease in the surrogate concentrations were calculated from the starting concentrations through the 100-year simulation for each closure alternative, at nine, downgradient CCR monitoring well locations MW-07 through MW-15.

The relative reduction of the surrogate concentration over time can be related to the dissolved mass of any constituent by applying the percent decrease of the surrogate concentration to an initial concentration of a specific constituent of concern. As noted above, an initial concentration was assigned at each of these nine monitoring well locations for specific constituents of concern based on the 4th quarter 2022 sampling event. The calculated percent decrease in the surrogate concentration over the 100-year model simulations was applied to the assigned initial concentration in each monitoring well. For example, the initial concentration (4th quarter 2022 sampling data) for arsenic in monitoring well MW-07 is 0.0032 milligrams per liter (mg/L). The initial, relative surrogate concentration in monitoring well MW-07 is 0.75 (relative to the source concentration of “1”). The decrease in the surrogate concentration throughout the 100-year closure scenario was calculated as a percentage of the initial, relative concentration in this monitoring well, and the percentage decrease was applied to the initial concentration of 0.0032 mg/L to yield a curve of decreasing arsenic concentrations for the model scenario. The resulting concentrations for each constituent of concern in each monitoring well was compared to the proposed Section 845.600(a) GWPSs for each constituent. The GWPSs are presented as dashed lines on each monitoring well’s decay curve graph for each modeled alternative.

The decay curves for arsenic concentrations are shown on Figures 27, 28, and 29 for monitoring wells downgradient of Ash Ponds 1N, 1S, 2S, and 3S, respectively for Closure Alternatives 1 through 4. The current concentrations of arsenic are below the proposed GWPSs for Ash Ponds 1N, 1S, 2S, and 3S in all downgradient monitoring wells except MW-10 and MW-11. Therefore, all of the arsenic decay curves start below the dashed line representing the arsenic proposed GWPSs on Figures 27 through 29, except in monitoring wells MW-10 and MW-11. Arsenic concentrations decrease over time in all four modeled alternatives, including in monitoring wells MW-10 and MW-11 (Figure 29). Arsenic concentrations decrease below the proposed GWPS in monitoring wells MW-10 and MW-11 in all closure alternatives within approximately 4 to 15 years.

The decay curves for boron concentrations are shown on Figures 30, 31, and 32 for monitoring wells downgradient of Ash Ponds 1N, 1S, 2S, and 3S, respectively for Closure Alternatives 1 through 4. The current concentrations of boron are below the proposed GWPSs for Ash Ponds 1N, 1S, 2S, and 3S in all downgradient monitoring wells therefore, all of the boron decay curves start below the dashed line representing the boron GWPSs on Figures 30 through 32. Boron concentrations decrease over time in all four modeled alternatives.

The decay curves for calcium concentrations are shown on Figures 33, 34, and 35 for monitoring wells downgradient of Ash Ponds 1N, 1S, 2S, and 3S, respectively for Closure Alternatives 1 through 4. The current concentrations of calcium are below the GWPSs for Ash Ponds 1N, 1S, 2S, and 3S in all downgradient monitoring wells except MW-15, therefore, all of the calcium decay curves start below the dashed line representing the calcium GWPSs on Figures 33 through 35 except for monitoring well MW-15. Calcium concentrations decrease over time in all four modeled alternatives at all well locations. At well MW-15, the calcium concentration is reduced to below the proposed GWPS of 109.5 mg/L in all four scenarios within approximately 2 to 5 years (Figure 33).

The decay curves for chloride concentrations are shown on Figures 36, 37, and 38 for monitoring wells downgradient of Ash Ponds 1N, 1S, 2S, and 3S, respectively for Closure Alternatives 1 through 4. The current concentrations of chloride are below the proposed GWPSs for Ash Ponds 1N, 1S, 2S, and 3S in all downgradient monitoring wells except MW-09 in which the chloride concentration is equal to the proposed GWPS of 200 mg/L. Therefore, all of the chloride decay curves start below the dashed line representing the chloride GWPSs on Figures 36 through 38 except for monitoring well MW-09. Chloride concentrations decrease over time in all four modeled alternatives. Chloride concentrations decrease below the proposed GWPS of 200 mg/L in monitoring well MW-09 in all closure alternatives within approximately 1 to 1.5 years (Figure 37).

The decay curves for molybdenum concentrations are shown on Figures 39, 40, and 41 for monitoring wells downgradient of Ash Ponds 1N, 1S, 2S, and 3S, respectively for Closure Alternatives 1 through 4. The current concentrations of molybdenum are below the proposed GWPSs for Ash Ponds 1N, 1S, 2S, and 3S in all downgradient monitoring wells except MW-08 in which the molybdenum concentration is slightly higher (0.11 mg/L) than the proposed GWPS of 0.1 mg/L. Therefore, all of the molybdenum decay curves start below the dashed line representing the molybdenum GWPSs on Figures 39 through 41 except for monitoring well MW-08. Molybdenum concentrations decrease over time in all four modeled alternatives. Molybdenum concentrations decrease below the proposed GWPS of 0.1 mg/L in monitoring well MW-08 in all closure alternatives within approximately 2 to 5 years (Figure 40).

The decay curves for sulfate concentrations are shown on Figures 42, 43, and 44 for monitoring wells downgradient of Ash Ponds 1N, 1S, 2S, and 3S, respectively for Closure Alternatives 1 through 4. The current concentrations of sulfate are below the GWPSs for Ash Ponds 1N, 1S, 2S, and 3S in all downgradient monitoring wells except MW-14 in which the sulfate concentration is higher (570 mg/L) than the proposed GWPS of 547.6 mg/L. Therefore, all of the sulfate decay curves start below the dashed line representing the sulfate GWPSs on Figures 42 through 44 except for monitoring well MW-14. Sulfate concentrations decrease over time in all four modeled alternatives. Sulfate concentrations decrease below the proposed GWPS of 547.6 mg/L in monitoring well MW-14 similarly in all closure alternatives within approximately 1.5 years (Figure 42).

6.0 SUMMARY

Four closure scenarios were evaluated as part of the closure alternatives analysis for closure of Ponds 1N, 1S, 2S, and 3S in accordance with 845.710(b). The four options evaluated are as follows:

1) Closure by removal;
2) Closure in place in Ponds 1N, 1S, 2S, and 3S with an FCS;
3) Closure in place with in-situ solidification/stabilization in both north and south portions with a soil cover; and
4) Closure in place by consolidating CCR from Ponds 2S and 3S in Ponds 1N and 1S with an FCS.

The options were evaluated based on effectiveness/protectiveness, ease of implementation, and addressing the concerns of the community residents.

Closure by removal would require the excavation, transportation, and disposal of 161,000 CY of CCR, warning layer material, and existing Poz-O-Pac liner and take approximately 210 days to complete. The CCR removed is assumed to be disposed of at Laraway RDF for the purposes of evaluating this alternative. If this alternative were to move forward, discussions with the landfill would have to occur prior to selecting this alternative. The area of the removed CCR would be partially re-filled with clean material and graded to prevent accumulation of standing water and facilitate drainage towards the existing ponds' discharge structure. Once the closure by removal is complete, groundwater monitoring in accordance 845.600 would occur for three (3) years.

The closure in place in all four ponds scenario requires filling the ponds to achieve the proper grades and constructing the FCS on this fill material. This scenario would require all four ponds to be filled with approximately 25,410 CY of additional material in order to bring the grade up to the proper elevations to allow precipitation to gravity flow off the FCS. The ClosureTurf FCS system would then be placed on top of the fill material in the ponds. Each ponds' FCS is sloped to drain towards the existing discharge structures in each pond. From the ponds, the water is recycled through the recirculation system and ultimately discharged through the station's NPDES permitted outfall. This option would take approximately 4 months to complete and groundwater monitoring in accordance with 845.600 would occur for thirty years.

The in-situ solidification/stabilization (ISS) treatment of the CCR in the ponds would be completed over an approximate 287,700 square feet area. This alternative would include the ISS of approximately 124,000 CY of CCR in the ponds. The ISS would be applied by soil mixing from the top of the CCR to the bottom most extent of the CCR. The completed ISS treatment area would be covered with a ClosureTurf FCS. It is anticipated that the swell material generated during treatment would be used to obtain the necessary grades to prevent ponding water. The ISS swell material would be sloped to allow water to drain towards the west perimeter of the ISS treatment area and the existing ponds' discharge structures. If the swell material quantity is inadequate, then clean soil will supplement as necessary to achieve the desired grades and slopes.

The closure in place by consolidation with an FCS alternative would consist of leaving the CCR in place in Ponds 1N and 1S, placing the CCR material from Ponds 2S and 3S into Ponds 1N and 1S, and covering that material with a final cover system in accordance with 845.750. The FCS would be sloped to allow for precipitation to runoff and drain into the existing Pond 1N and 1S discharge structures. The water from the Pond 1N and 1S discharge structures is discharged to the CSSC through the permitted outfall in compliance with the existing NPDES permit. The existing CCR material, warning layer, and Poz-O-Pac liner from Ponds 2S and 3S will be added to Ponds 1N and 1S and graded to slope towards the existing drainage structure to allow drainage to prevent the accumulation of precipitation. It may be necessary to add addition fill material to achieve the desired grade elevations. Up to 64,600 CY of material from Ponds 2S and 3S will be consolidated between Ponds 1N and 1S. The ClosureTurf FCS would then be placed on top of the sloped surface with the geomembrane being attached to the discharge structure, the synthetic turf placed on top of the geomembrane, and the turf infilled with sand/small aggregate. The surface of the final protective layer will be sloped towards the Ponds 1N and 1S discharge structure to allow for drainage. The soils used in the FCS will consist of clean material sourced from as close to Pond 1N and 1S as possible. It may be necessary to use multiple soil sources.

Groundwater modeling has shown that all four (4) closure alternatives reduce concentrations of groundwater constituents to levels below the proposed groundwater protection standards in the downgradient monitoring wells.

7.0 PROFESSIONAL ENGINEER'S CERTIFICATION

This closure alternatives analysis has been prepared in accordance with 35 Ill. Adm. Code 845.710.

Joshua D. Davenport, P.E.
Illinois Professional Engineer

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062-061945

TABLES

Table 1 - Closure Alternatives Evaluation

35 Ill. Adm. Code Part 845.710(b)(1) through 845.710(b)(4) Requirements		Closure Alternatives			
		Closure by Removal	**Closure-in-Place with a Final Cover System**	**Closure-in-Place with Insitu Stabilization/Solidification**	**Consolidation & Closure-in-Place with a Final Cover System**
845.710(b)(1)(A)	Magnitude of existing risk reduction	The excavation and removal of the CCR from the four ponds would remove a potential source. This will prevent any precipitation from contacting existing CCR and the potential from passing through the unsaturated CCR into the groundwater. The excavation and removal of CCR also eliminates human/animal exposure to any CCR. The groundwater modeling has shown that by removing the CCR source material, a reduction of about 80% would occur in groundwater concentrations after 50 years.	Closing the CCR ponds in place with the ClosureTurf final cover system will prevent infiltration through the CCR material. The final cover system also eliminates human/animal exposure to any CCR, in addition to removing the hazard of an open pond. The final cover system would be constructed by grading the existing CCR in each pond, filling each pond with clean material and covering with a geomembrane infiltration layer that has a permeability of 1 x 10^{-13} cm/s, which is covered with a synthetic turf/small aggregate infill erosion layer. This type of cover system has been used throughout the country since 2009 to effectively close CCR surface impoundments. The groundwater modeling has shown that a reduction of 20%-70% of groundwater concentrations would occur after 25 years with the groundwater concentrations reaching steady state conditions at this time with no further increases in groundwater concentrations.	Closing the CCR in place with treating the CCR with in-situ solidification/stabilization will prevent infiltration through the CCR material that may be present. The soil cover also eliminates human/animal exposure to any CCR, in addition to removing the hazard of an open area. The ISS would be conducted by mixing the CCR with reagents (cement, bentonite) using either an excavator bucket or a large diameter auger, followed up by covering with ClosureTurf. The ISS would have a permeability of less than 1 x 10^{-7} cm/s. This type of technology has been used throughout the country since the 1960's to effectively treat impacted soil throughout the country. The groundwater modeling has shown that a reduction of approximately 80% of groundwater concentrations would occur after 25 years and the groundwater concentrations would reach a steady state condition after 25 years.	Closing the CCR in place with the ClosureTurf final cover system will prevent infiltration through the CCR material that may be present. The final cover system also eliminates human/animal exposure to any CCR. The final cover system would be constructed by consolidating the CCR from Ponds 2S and 3S into Ponds 1N and 1S and covering with a geomembrane infiltration layer that has a permeability of 1 x 10^{-13} cm/s, which is covered with a synthetic turf/sand infill erosion layer. This type of cover system has been used throughout the country since 2009 to effectively close CCR surface impoundments. The groundwater modeling has shown that a reduction of 70% of groundwater concentrations would occur after 25 years and the groundwater concentrations would reach a steady state condition after 25 years with no further increases in groundwater concentrations.
845.710(b)(1)(B)	Likelihood of future CCR releases	Since the CCR would be removed, the likelihood of a future CCR release is eliminated. Groundwater monitoring would continue after the removal occurs to identify if concentrations are present above the GWPSs.	Covering the CCR would prevent the future release of CCR because it would not be exposed to surface water runoff and the potential for erosion. Releases of CCR to the Des Plaines River have not been identified. The material brought on-site would be evaluated to determine that it will not cause a future release.	Solidifiying and covering the CCR would prevent the future release of CCR because it would not be exposed to surface water runoff, infiltration, and the potential for erosion. Releases of CCR to the Des Plaines River has not been identified. The material brought on-site would be evaluated to determine that it will not cause a future release.	Covering the CCR would prevent the future release of CCR because it would not be exposed to surface water runoff and the potential for erosion. Releases of CCR to the Des Plaines River has not been identified. The material brought on-site would be evaluated to determine that it will not cause a future release.
845.710(b)(1)(C)	Long-term management required	Long-term management of the ponds would be very minimal because the CCR would be removed. Therefore, there is no potential for future releases and no inspections required. Groundwater monitoring is required in accordance with 845.740(b) and 845.600. Groundwater monitoring is required for at least 3 years.	Post-closure activities will be required in accordance with 845.780 which includes regular inspections of the ClosureTurf FCS and groundwater monitoring. The post-closure care period is at least 30 years.	Post-closure activities will be required in accordance with 845.780 which includes regular inspections of the ClosureTurf and groundwater monitoring. The post-closure care period is at least 30 years.	Post-closure activities will be required in accordance with 845.780 which includes regular inspections of the ClosureTurf FCS and groundwater monitoring. The post-closure care period is at least 30 years.
845.710(b)(1)(D)	Short-term risks to the community during closure activities	The short-term risk to the community is very minimal to non-existent. The only potential risk would be from an increase in truck traffic hauling the CCR for offsite disposal and truck traffic returning to the site because each truck will make multiple trips per day for disposal. Over 10,700 truck loads is required to haul the CCR off-site for disposal. This has the potential to cause 0.133 traffic accident injuries and 0.006 traffic accident fatalities based on a 20-mile round trip for each truckload. 10,700 truckloads has the potential to produce 43 lbs of particulate matter emissions.	The short-tem risk to the community is minimal and would come from the increased truck traffic bringing the fill material and ClosureTurf FCS supplies to the site. Filling the ponds to the required elevations would require approximately 23,500 CY of additional clean material from off-site and approximately 1,600 trucks to transport this material. The ClosureTurf materials would require approximately 57 truckloads. This has the potential to cause 0.0250 traffic accident injuries and 0.0012 traffic accident fatalities based on a 20-mile round trip for each truckload. The total number of truckloads has the potential to produce approximately 8 lbs of particulate matter emissions.	The short-tem risk to the community is minimal and would come from the increased truck traffic bringing the ClosureTurf FCS supplies to the site. Bringing the ClosureTurf FCS materials would require approximately 61 truckloads. This has the potential to cause 0.0167 traffic accident injuries and 0.0008 traffic accident fatalities. The total number of truckloads has the potential to produce approximately 5 lbs of particulate matter emissions.	The short-tem risk to the community is minimal and would come from the increased truck traffic bringing the ClosureTurf FCS supplies to the site. Consolidating CCR from Ponds 2S and 3S would require moving approximately 64,600 CY of CCR material and approximately 4,300 truckloads to transport this material, but this material is transported onsite and would not encounter offsite traffic. The ClosureTurf supplies transportation has the potential to cause 0.0016 traffic accident injuries and 0.0001 traffic accident fatalities based on tranport from South Carolina to Romeoville for the supplies. The total number of truckloads has the potential to produce approximately 0.5 lbs of particulate matter emissions.
845.710(b)(1)(E)	Time to complete closure, post-closure or 845.740(b) groundwater monitoring	Excavation and disposal of the ponds' 161,000 CY of CCR is estimated to take over 210 days, based on disposing of 50 trucks/day of CCR. Post-closure activities are not required when closure by removal is performed, but groundwater monitoring must be conducted for at least 3 years after closure activities.	The total anticipated time to complete closure construction is 4 months and post-closure activities will take 30 years, which includes groundwater monitoring.	The total anticipated time to complete closure construction is up to 9 months and post-closure activities will take 30 years, which includes groundwater monitoring.	The total anticipated time to complete closure construction is 4 months and post-closure activities will take 30 years, which includes groundwater monitoring.
845.710(b)(1)(F)	Potential threat to human health and environment	The potential threat to human health and the environment is minimal to non-existent because the CCR source material has been removed. Groundwater monitoring has shown that impacts to groundwater are not present.	The potential threat to human health and the environment is minimal to non-existent because the CCR has been covered and no exposure routes are available. Infiltration through the existing CCR has been almost eliminated because of the FCS. Drinking water sources are not located in the area.	The potential threat to human health and the environment is minimal to non-existent because the CCR has been solidified and covered and no exposure routes are available. Infiltration through the existing CCR has been almost eliminated because of the FCS. Drinking water sources are not located in the area.	The potential threat to human health and the environment is minimal to non-existent because the CCR in Ponds 2S and 3S have been removed and consolidated with the CCR in Ponds 1N and 1S, which is then covered and no exposure routes are available. Infiltration through the remaining CCR has been almost eliminated because of the FCS. Drinking water sources are not located in the area.
845.710(b)(1)(G)	Long-term reliability of engineering/institutional controls	Having removed all the CCR is the most reliable alternative because the potential for any source material to remain is non-existent.	Geomembrane final cover systems and specifically ClosureTurf have been used throughout the country to effectively prevent CCR and other solid wastes from impacting human health and the environment.	The ISS treatment creates a solidified/stabilized monolith of CCR with cement and sometimes bentonite to improve impermeability. The typical lifespan of concrete is greater than 30 years up to 100 years and the neutral pH of the groundwater will not degrade the monolith, extending its lifespan.	Geomembrane final cover systems and specifically ClosureTurf have been used throughout the country to effectively prevent CCR and other solid wastes from impacting human health and the environment.
845.710(b)(1)(H)	Potential for future corrective action	Because the CCR is being removed, the need for future corrective actions is not present.	Groundwater modeling has shown that the concentrations will decrease with the closure alternative, so the potential for future correction is minimal.	Groundwater modeling has shown that the concentrations will decrease by approximately 80% after 25 years with this closure alternative, so the potential for future correction is minimal.	Groundwater modeling has shown that the concentrations will decrease with the closure alternative by approximately 70% after 25 years with this closure alternative, so the potential for future correction is minimal.

Table 1 - Closure Alternatives Evaluation

35 Ill. Adm. Code Part 845.710(b)(1) through 845.710(b)(4) Requirements		Closure Alternatives			
		Closure by Removal	**Closure-in-Place with a Final Cover System**	**Closure-in-Place with Insitu Stabilization/Solidification**	**Consolidation & Closure-in-Place with a Final Cover System**
845.710(b)(2)(A)	The extent containment reduces further releases	The CCR has been removed from the ponds and the potential for further releases is non-existent.	The CCR would remain within the confinements of the ponds and below the FCS. Previous groundwater monitoring has shown that a release of CCR has not occurred. The geomembrane used in the FCS prevent the infiltration of water thereby preventing any further release.	The CCR would remain within the confinements of the ponds and solidified using cement. The permeability would be less than $1x10^{-7}$ cm/s, preventing groundwater and precipitation from traveling through the CCR thereby preventing any further release. Previous groundwater monitoring has shown that a release of CCR has not occurred. The soil cover minimizes the direct contact to the solidified CCR.	The CCR would remain within the confinements of Ponds 1N and 1S below the FCS. Previous groundwater monitoring has shown that a release of CCR has not occurred. The geomembrane used in the FCS prevent the infiltration of water thereby preventing any further release.
845.710(b)(2)(B)	Extent of the use of treatment technologies	Treatment will not be occurring as part of this closure alternative. The only technology used is the construction equipment to execute the removal.	Treatment will not be occurring as part of this closure alternative. ClosureTurf technology will be used to create the FCS. ClosureTurf consists of a geomembrane liner with synthetic turf and sand/small aggregate on top of the geomembrane. ClosureTurf has been successfully used at other CCR surface impoundments and landfills as cover systems.	ISS is the treatment technology that will be used as part of this scenario. No other technologies will be used. The completed ISS monolth will be covered with a soil cover that is then seeded.	Treatment will not be occurring as part of this closure alternative. ClosureTurf technology will be used to create the FCS. ClosureTurf consists of a geomembrane liner with synthetic turf and sand/small aggregate on top of the geomembrane. ClosureTurf has been successfully used at other CCR surface impoundments and landfills as cover systems.
845.710(b)(3)(A)	Degree of difficulty associated with constructing technology	Removing and disposing of the CCR is not diffult work and many contractors are able to perform this type of work. Finding a disposal location would be the most difficult because existing facilities may not accept the CCR and the permitting and constructing of a new landfill is difficult due to potential environmental and local resistance and availability of materials.	Filling, grading, and compacting in the ponds is not difficult. This is a process that has been occurring for many years and several construction companies in the area are capable of performing this work. The installation of the ClosureTurf system is not difficult, but the provider of ClosureTurf requires a certified company perform the work. This limits the availability of installation contractors because the certified list of contractors is a limited number. ClosureTurf has been successfully installed in over 17 states throughout the country beginning in 2009. These states include New York, California, Minnesota, and Massachusetts.	ISS has been effectively used since the 1960's. The companies that routinely perform ISS treatment do not have difficulties with implementing this scenario.	Excavating, grading, and compacting CCR from Ponds 2S and 3S into Ponds 1N and 1S is not difficult. This type of work has routinely been performed throughout the country. This is a process that has been occurring for many years and several construction companies in the area are capable of performing this work. The installation of the ClosureTurf system is not difficult, but the provider of ClosureTurf requires a certified company perform the work. This limits the availability of installation contractors because the certified list of contractors is a limited number. ClosureTurf has been successfully installed in over 17 states throughout the country beginning in 2009. These states include New York, California, Minnesota, and Massachusetts.
845.710(b)(3)(B)	Expected operational reliability of the technologies	This closure alternative does not require the operation of any technologies. The construction equipment that would be used to excavate and haul the CCR are expected to operate without interruption.	ClosureTurf has operated reliably at the other installations around the country. ClosureTurf experienced a hurricane in South Carolina that produced a 26-inch rainfall, which did not damage the ClosureTurf and so minimally displaced the sand infill that no maintenance was required.	ISS has been effectively used to treatment soil impacts and CCR. QA/QC efforts as part of the treatment is constantly performed and has shown that permeabilites are routinely less than $1x10^{-7}$ cm/s. Unconfined compressive strength of the soil is typically greater than 50 psi.	ClosureTurf has operated reliably at the other installations around the country. ClosureTurf experienced a hurricane in South Carolina that produced a 26-inch rainfall, which did not damage the ClosureTurf and so minimally displaced the sand infill that no maintenance was required.
845.710(b)(3)(C)	Need to coordinate with and obtain necessary approvals and permits from other agencies	This closure alternative would require approval from the Illinois EPA.	This closure alternative would require approval from the Illinois EPA.	This closure alternative would require approval from the Illinois EPA.	This closure alternative would require approval from the Illinois EPA.
845.710(b)(3)(D)	Availability of necessary equipment and specialists	Equipment and personnel are easily available to excavate the CCR. Locating a disposal location is the most difficult part of this alternative.	This closure alternative would require a contractor that is approved by Watershed Geo to install ClosureTurf. Several contractors throughout the country have been certified to install ClosureTurf. The availability of a certified ClosureTurf installer is less than an earthwork contractor, but it should not be a concern.	This closure alternative would require a contractor that is capable of performing in-situ solidification/stabilization. Several contractors throughout the country are able to perform this work. The availability of an ISS contractor is less than an earthwork contractor, but it should not be a concern.	This closure alternative would require a contractor that is capable of performing hydraulic dredging and a contractror approved by Watershed Geo to install ClosureTurf. Several contractors throughout the country have been certified to install ClosureTurf. The availability of a hydraulic dredging contractor and certified ClosureTurf installer is less than an earthwork contractor, but it should not be a concern.

Table 1 - Closure Alternatives Evaluation

35 Ill. Adm. Code Part 845.710(b)(1) through 845.710(b)(4) Requirements		**Closure Alternatives**			
		Closure by Removal	**Closure-in-Place with a Final Cover System**	**Closure-in-Place with Insitu Stabilization/Solidification**	**Consolidation & Closure-in-Place with a Final Cover System**
845.710(b)(3)(E)	Available capacity and location of needed treatment, storage, and disposal services	The available capacity of disposal for 161,000 CY is expected to be difficult to obtain. The location for any disposal is unknown and would require contacting proper disposal facilities in the area to inquire about space availability. Based on the 2021 Landfill Capacity Report, Laraway RDF has capacity in excess of 5 million CY, but at this time Laraway RDF's existing air space has all been contracted. Disposal facilities are reluctant to accept CCR because of concerns with interactions between CCR and existing waste.	This closure alternative does not require treatment, storage, or disposal services. Any storage of materials would occur at the station	This alternative does not require any disposal or storage services. Any storage of materials would occur at the station. This alternative uses the ISS treatment technology performed by specialized contractors trained in this type of work. These contractors are specialized, however, there availability is not detrimental to the completion of this alternative.	This closure alternative does not require treatment, storage, or disposal services. Any storage of materials would occur at the station
845.710(b)(4)	Degree to which community concerns are addressed	All the potential closure alternatives address the community concerns. The community is concerned about the potential for future groundwater contamination which is addressed by the closure alternatives. The CCR is removed from its existing location and contact with future precipitation is removed.	All the potential closure alternatives address the community concerns. The community is concerned about the potential for future groundwater contamination which is addressed by the closure alternatives. The installation of an FCS would prevent the infiltration of precipitation which would minimize contamination of groundwater from the remaining CCR.	All the potential closure alternatives address the community concerns. The community is concerned about the potential for future groundwater contamination which is addressed by the closure alternatives. The stabilization/solidification would prevent the infiltration of precipitation which would minimize contamination of groundwater from the remaining CCR.	All the potential closure alternatives address the community concerns. The community is concerned about the potential for future groundwater contamination which is addressed by the closure alternatives. The consolidation of CCR and installation of an FCS would prevent the infiltration of precipitation which would minimize contamination of groundwater from the remaining CCR.
845.710(d)(4)	Assessment of Impacts to Waters in the State	This closure alternative does not impact the Des Plaines River or the Chicago Sanitary and Ship Canal. The groundwater modeling performed in support of this analysis has shown that any theoretical impacts to the river are reduced to less than 80% of the original concentration after 50 years. By 100 years, the dissolved mass is effectively removed from shallow groundwater.	This closure alternative does not impact the Des Plaines River or the Chicago Sanitary and Ship Canal. The groundwater modeling performed in support of this analysis has shown that any theoretical impacts to the river are reduced to less than 80% of the original concentration after 50 years. By 100 years, the dissolved mass is effectively removed from shallow groundwater.	This closure alternative does not impact the Des Plaines River or the Chicago Sanitary and Ship Canal. Groundwater modeling perofrmed in support of this analysis has shown that any theoretical impacts to the river are reduced to about 80% of the original concentration after 25 years.	This closure alternative does not impact the Des Plaines River or the Chicago Sanitary and Ship Canal. Groundwater modeling performed in support of this analysis has shown that any theoretical impacts to the river are reduced by about 70% of the original concentration after 25 years.

Table 2: Closure Alternatives Analysis Cost Estimates Comparison

Scenario 1: Closure Costs for Closure By Removal & Disposal at Landfill

Construction Activity	Cost
Mobilization/Demobilization	$60,000
Site Preparation	$21,534
Dewatering	$9,666
Pond 1N, 1S, 2S, 3S Excavation	$5,574,498
Bottom Fill	$1,281,652
Indian Creek Landfill RDF Disposal	$11,838,517
Construction Subtotal	$18,785,866
Construction Management (4.5%)	$845,364
Engineering & Design (10%)	$694,735
Owner Construction Supervision (4.5%)	$845,364
30% Contingency	$5,635,760
CLOSURE TOTAL	$26,807,089

Scenario 2: Closure Costs for Closure in Place with a Final Cover System

Construction Activity	Cost
Mobilization/Demobilization	$60,000
Site Preparation	$17,015
Dewatering	$9,666
Ponds 1N, 1S, 2S, 3S Site Grading	$840,474
ClosureTurf Cover System	$1,184,682
Construction Subtotal	$2,111,837
Construction Management (4.5%)	$95,033
Engineering & Design (10%)	$92,716
Owner Construction Supervision (4.5%)	$41,722
30% Contingency	$633,551
CLOSURE TOTAL	$2,974,859

Scenario 3: In-Situ Stabilzation with Final Cover System

Construction Activity	Cost
Mobilization/Demobilization	$60,000
Site Preparation	$21,534
Dewatering	$9,666
Geomembrane Removal	$430,812
Ponds 1N, 1S, 2S, and 3S ISS	$7,412,422
ClosureTurf Cover System	$1,077,521
Construction Subtotal	$9,011,955
Construction Management (4.5%)	$405,538
Engineering & Design (10%)	$793,443
Owner Construction Supervision (4.5%)	$405,538
30% Contingency	$2,703,587
CLOSURE TOTAL	$13,320,061

Scenario 4: Closure Costs for Closure in Place with Consolidation & Final Cover System

Construction Activity	Cost
Mobilization/Demobilization & Site Preparation	$60,000
Site Preparation & Dewatering	$31,200
Pond 2S, 3S Excavation	$1,204,273
Discharge & Inlet Structures Demolition	$101,692
Bottom Fill	$616,992
ClosureTurf Cover System	$567,524
Construction Subtotal	$2,581,681
Construction Management (4.5%)	$116,176
Engineering & Design (10%)	$201,416
Owner Construction Supervision (4.5%)	$116,176
30% Contingency	$774,504
CLOSURE TOTAL	$3,789,953

.

FIGURES

0 100'
APPROXIMATE SCALE

ENVIRONMENTAL CONSULTATION & REMEDIATION

KPRG

KPRG and Associates, inc.

14665 West Lisbon Road, Suite 1A Brookfield, Wisconsin 53005 Telephone 262-781-0475 Facsimile 262-781-0478

414 Plaza Drive, Suite 106 Westmont, Illinois 60559 Telephone 630-325-1300 Facsimile 630-325-1593

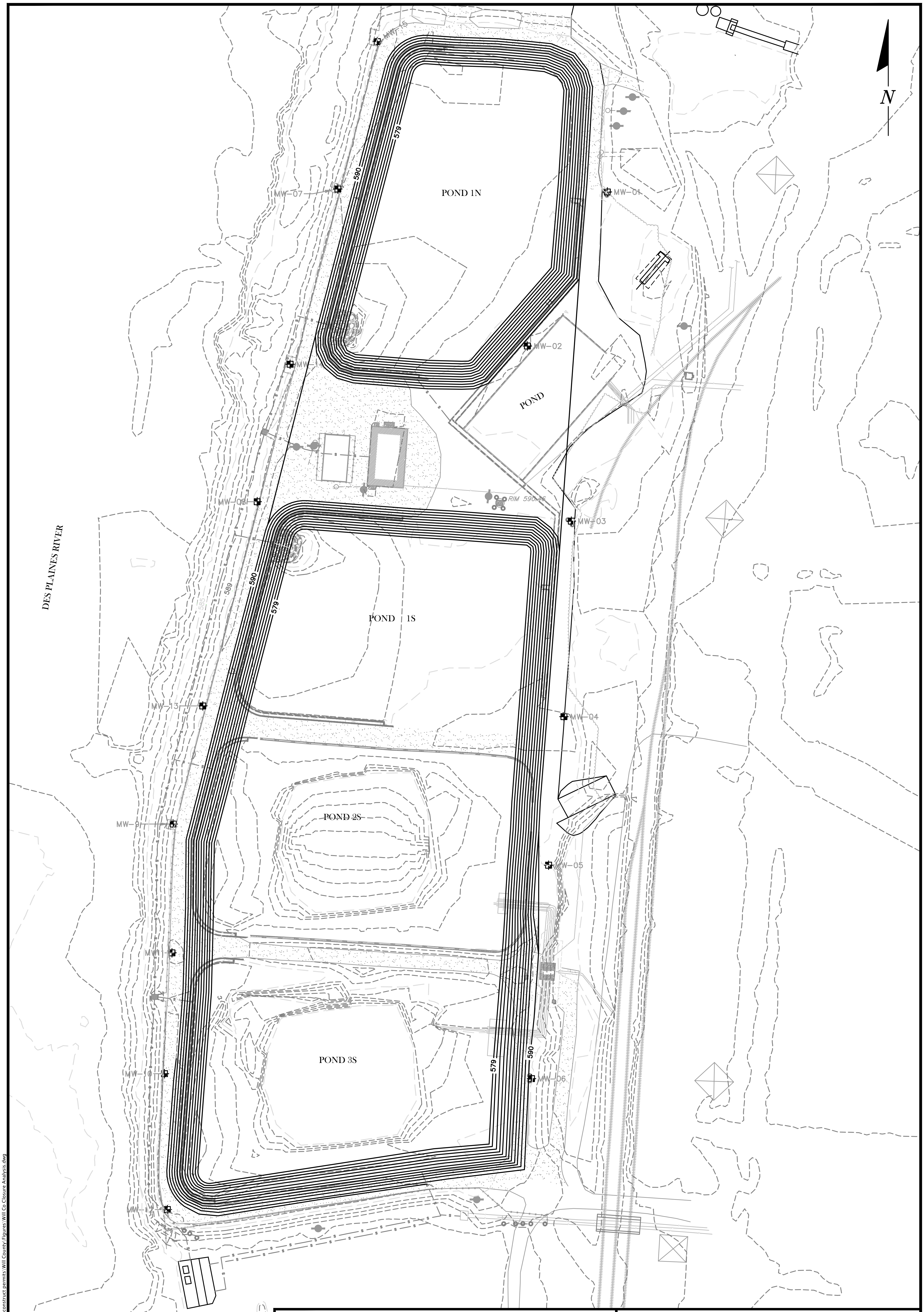
EXISTING SITE CONDITIONS

WILL COUNTY GENERATING STATION
ROMEOVILLE, ILLINOIS

Scale: 1" = 100'
Date: May 1, 2023

KPRG Project No. 19620.3
FIGURE 1

W:\projects\midwest generation\operating & construct permits\Will County\Figures\Will Co Closure Analysis.dwg



LEGEND

590 ——— PROPOSED CONTOURS
585 - - - EXISTING CONTOURS

0 100'
APPROXIMATE SCALE

E N V I R O N M E N T A L C O N S U L T A T I O N & R E M E D I A T I O N

KPRG

KPRG and Associates, inc.

14665 West Lisbon Road, Suite 1A Brookfield, Wisconsin 53005 Telephone 262-781-0475 Facsimile 262-781-0478

414 Plaza Drive, Suite 106 Westmont, Illinois 60559 Telephone 630-325-1300 Facsimile 630-325-1593

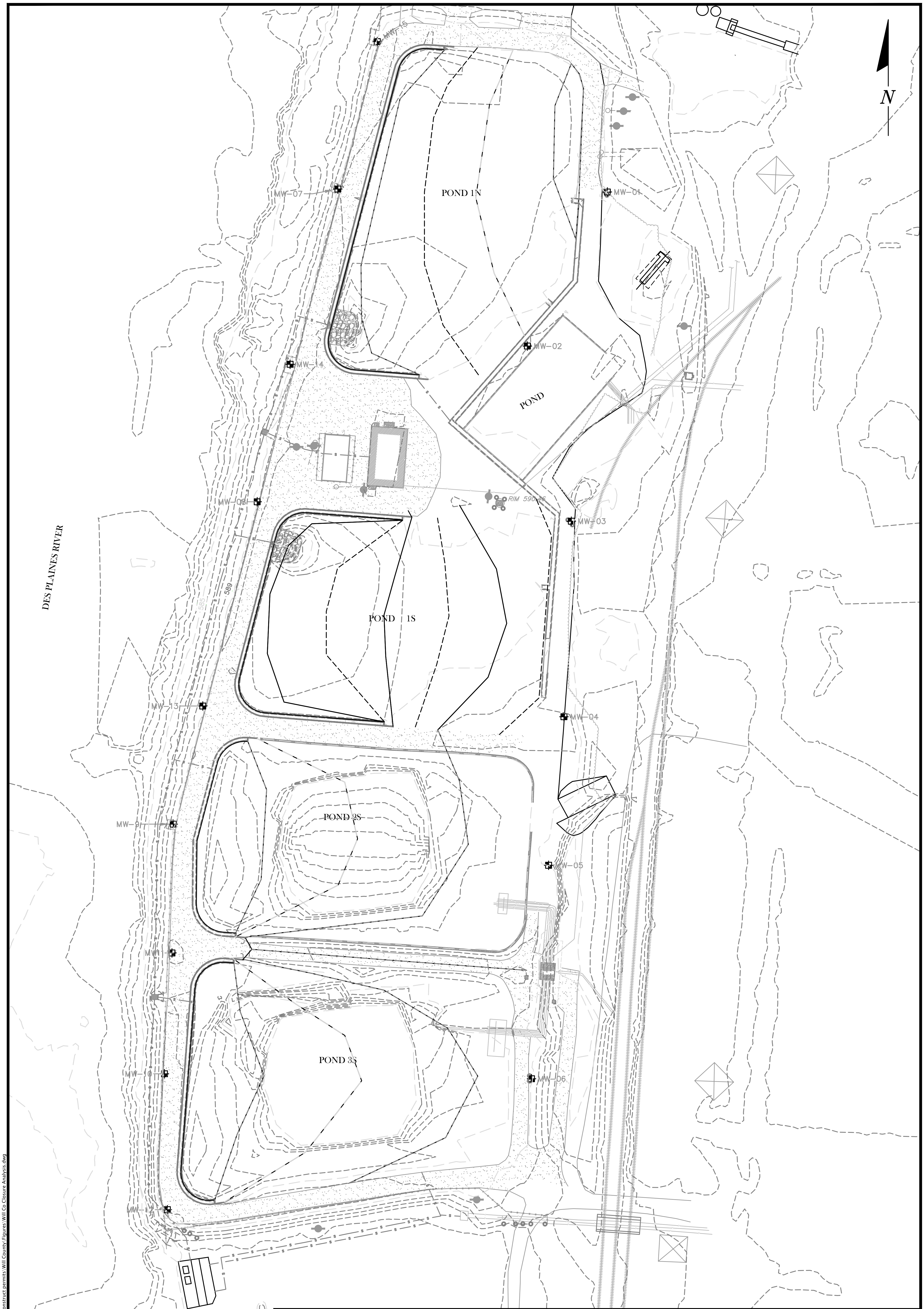
CLOSURE BY REMOVAL ALTERNATIVE

WILL COUNTY GENERATING STATION
ROMEOVILLE, ILLINOIS

Scale: 1" = 100'
Date: May 2, 2023

KPRG Project No. 19620.3
FIGURE 2

W:\projects\midwest generation\operating & construct permits\Will County\Figures\Will Co Closure Analysis.dwg



LEGEND

590 ——— PROPOSED CONTOURS
585 - - - EXISTING CONTOURS

0 100'
APPROXIMATE SCALE

E N V I R O N M E N T A L C O N S U L T A T I O N & R E M E D I A T I O N

K P R G

KPRG and Associates, inc.

14665 West Lisbon Road, Suite 1A Brookfield, Wisconsin 53005 Telephone 262-781-0475 Facsimile 262-781-0478

414 Plaza Drive, Suite 106 Westmont, Illinois 60559 Telephone 630-325-1300 Facsimile 630-325-1593

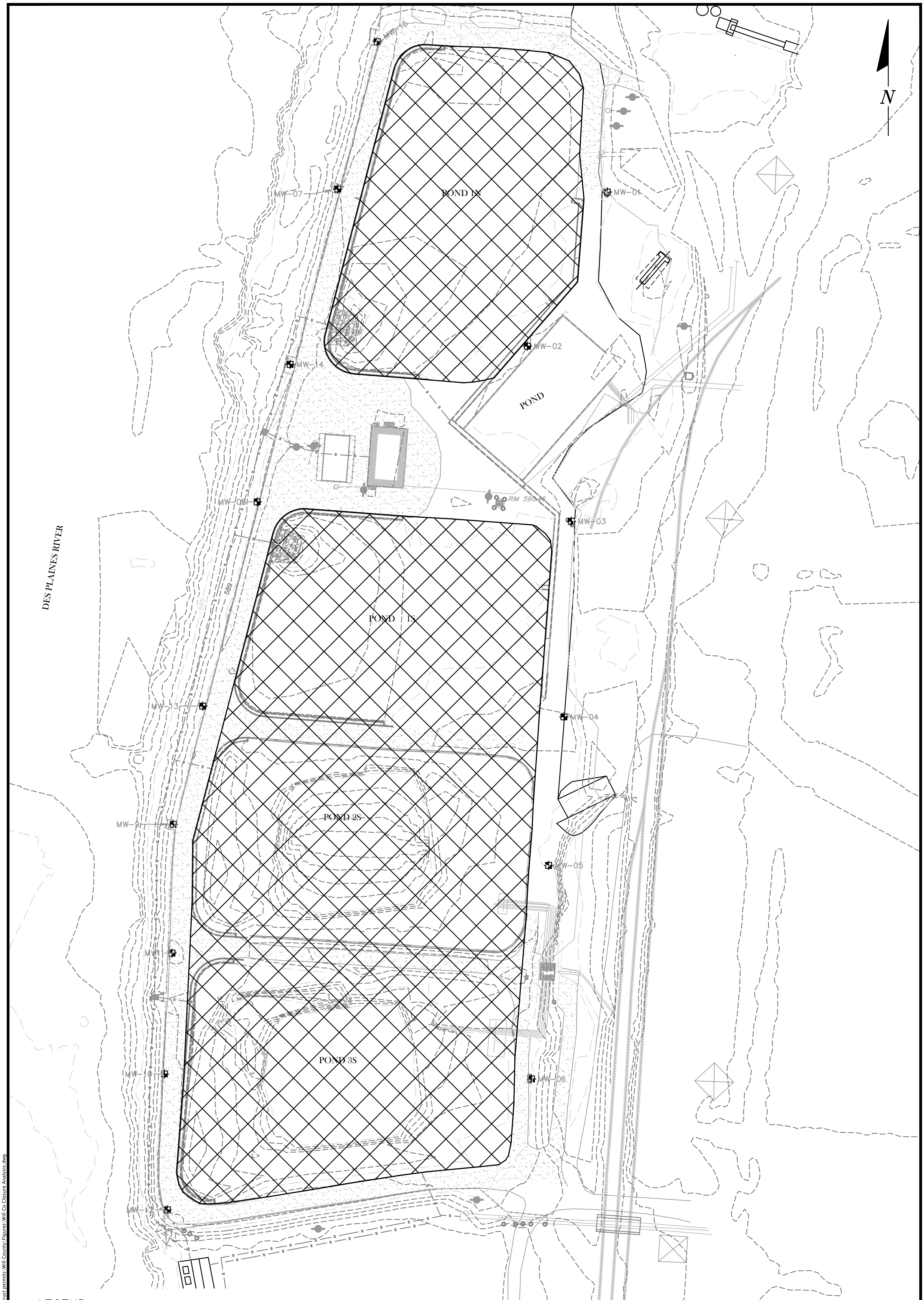
CLOSURE In PLACE ALTERNATIVE

WILL COUNTY GENERATING STATION
ROMEOVILLE, ILLINOIS

Scale: 1" = 100'
Date: May 2, 2023

KPRG Project No. 19620.3
FIGURE 3

W:\projects\midwest generation\operating & construct permits\Will County\Figures\Will Co Closure Analysis.dwg



LEGEND

▨ PROPOSED AREA OF IN-SITU STABILIZATION/SOLIDIFICATION

0 100'
APPROXIMATE SCALE

E N V I R O N M E N T A L C O N S U L T A T I O N & R E M E D I A T I O N

K P R G

KPRG and Associates, inc.

14665 West Lisbon Road, Suite 1A Brookfield, Wisconsin 53005 Telephone 262-781-0475 Facsimile 262-781-0478

414 Plaza Drive, Suite 106 Westmont, Illinois 60559 Telephone 630-325-1300 Facsimile 630-325-1593

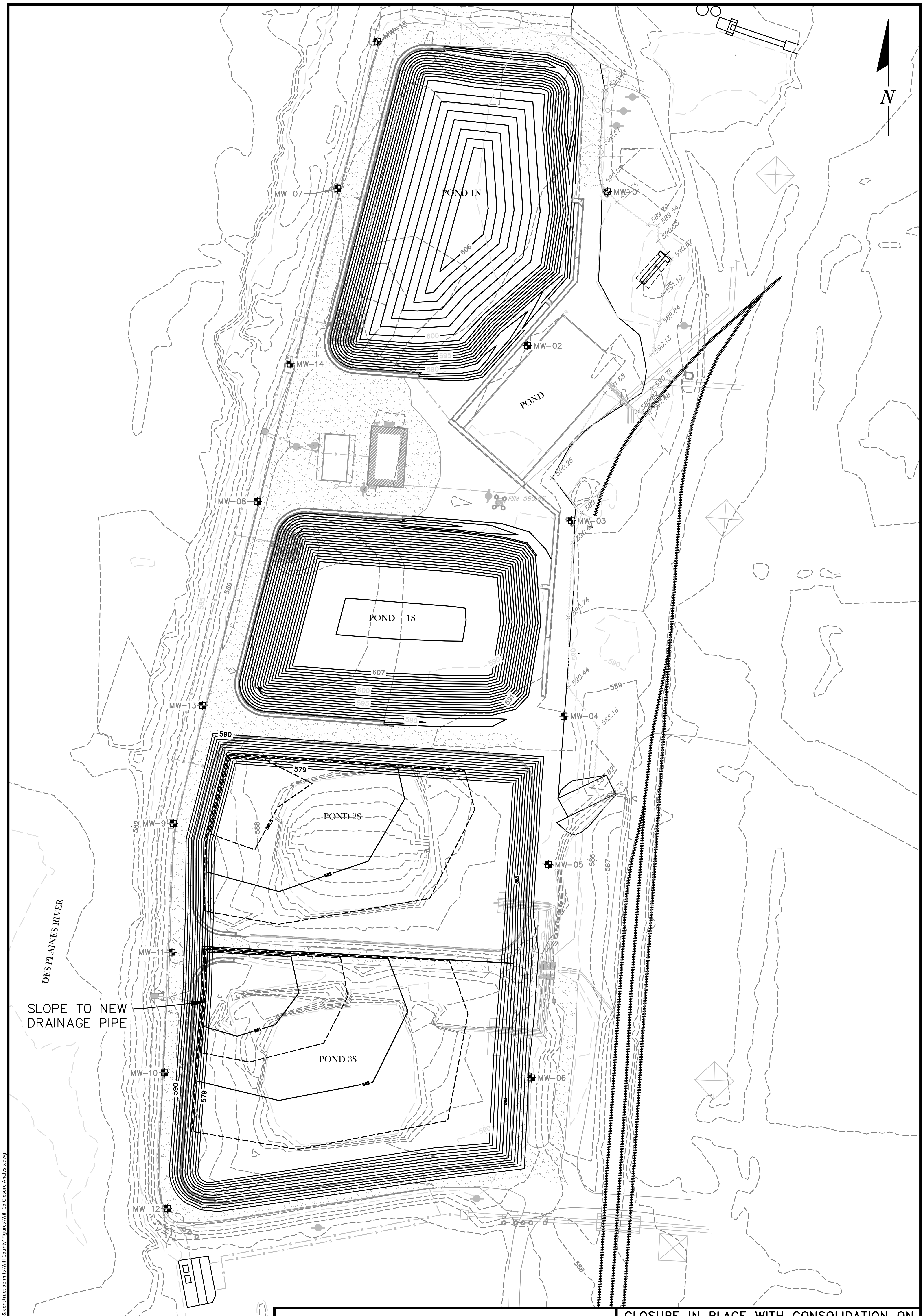
CLOSURE BY IN-SITU
STABILIZATION/SOLIDIFICATION ALTERNATIVE

WILL COUNTY GENERATING STATION
ROMEOVILLE, ILLINOIS

Scale: 1" = 100'
Date: May 2, 2023

KPRG Project No. 19620.3
FIGURE 4

W:\projects\midwest generation\operating & construct permits\Will County\Figures\Will Co Closure Analysis.dwg



LEGEND

590	PROPOSED CONTOURS
585	EXISTING CONTOURS

0 100'

APPROXIMATE SCALE

E N V I R O N M E N T A L C O N S U L T A T I O N & R E M E D I A T I O N

KPRG

KPRG and Associates, inc.

14665 West Lisbon Road, Suite 1A Brookfield, Wisconsin 53005 Telephone 262-781-0475 Facsimile 262-781-0478

414 Plaza Drive, Suite 106 Westmont, Illinois 60559 Telephone 630-325-1300 Facsimile 630-325-1593

CLOSURE IN PLACE WITH CONSOLIDATION ON POND 1N AND POND 1S

WILL COUNTY GENERATING STATION
ROMEOVILLE, ILLINOIS

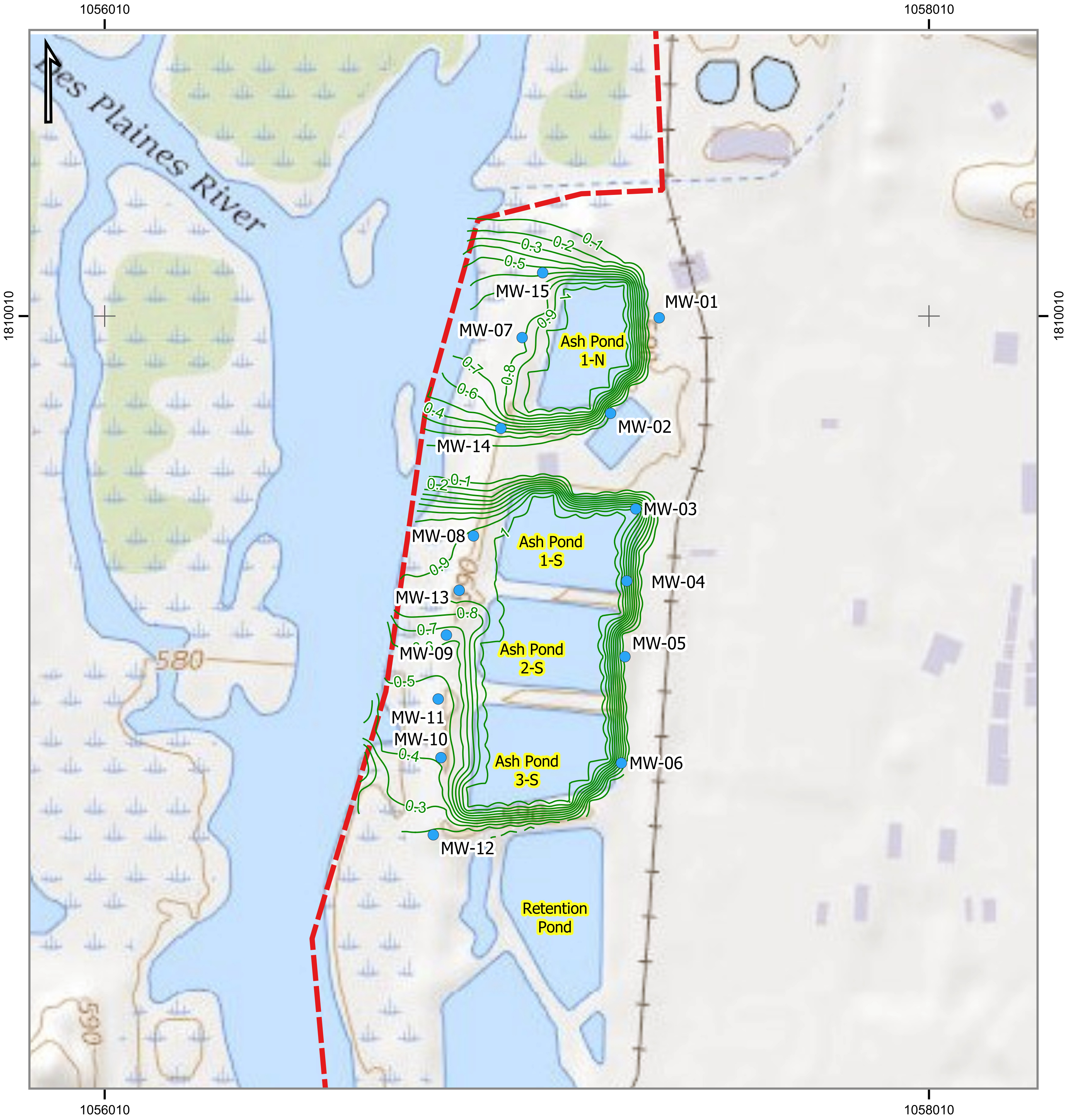
Scale: 1" = 100'
Date: May 2, 2023

KPRG Project No. 19620.3

FIGURE 5

W:\projects\midwest generation\operating & construct permits\Will County\Figures\Will Co Closure Analysis.dwg

ATTACHMENT 1



LEGEND

● SITE MONITORING WELL

🟥 APPROXIMATE SITE BOUNDARY

— 100-YEAR RELATIVE SURROGATE CONCENTRATIONS

Maximum relative concentrations above competent bedrock

0 200 400 ft

FEET

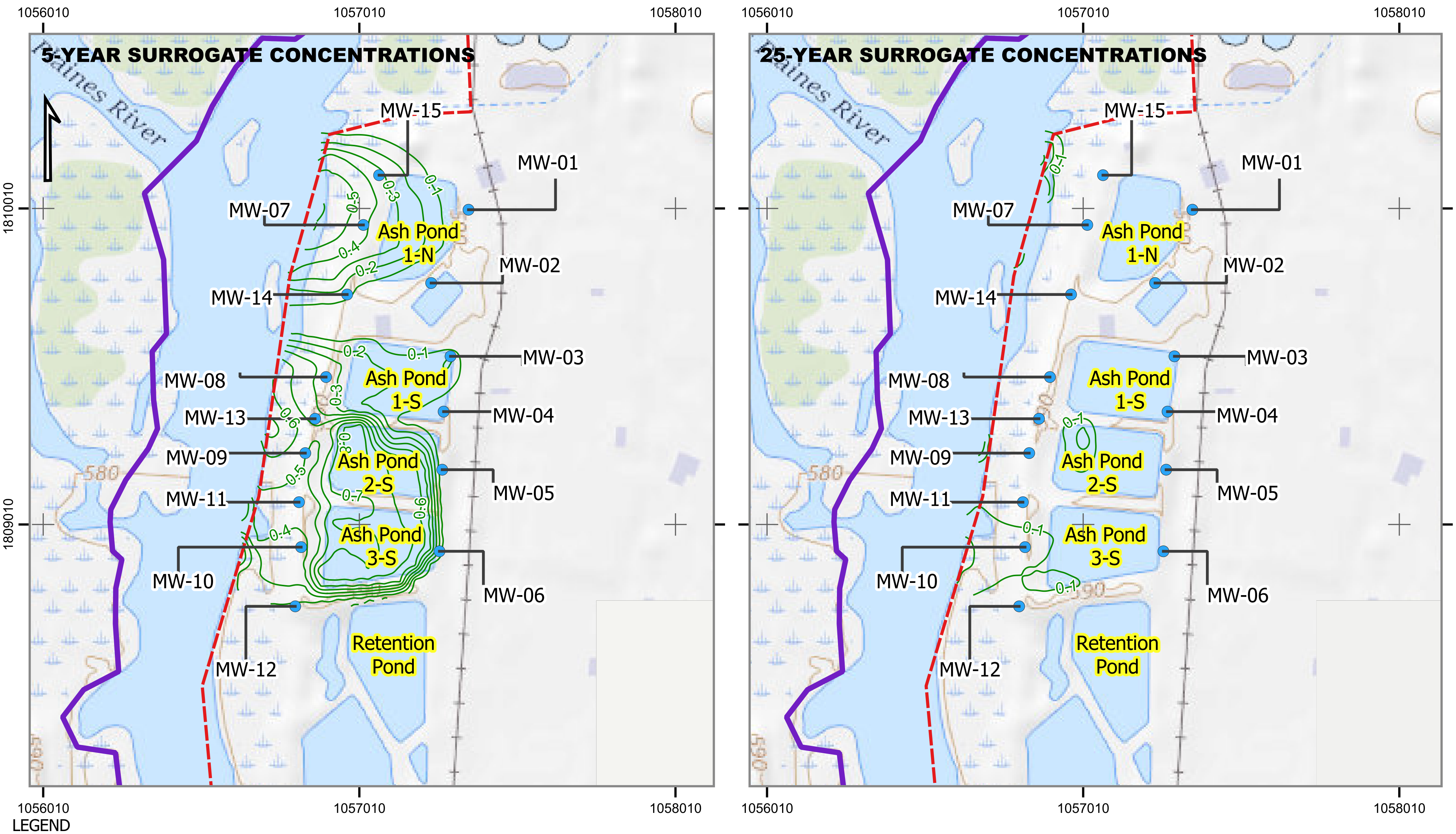
Coordinate System: NAD_1983_StatePlane_Illinois_East_FIPS_1201_Feet
Project File: Figure16_SurrogateSimulations.qgz

BAS GROUNDWATER CONSULTING

KPRG

CLIENT	MIDWEST GENERATION
SITE	WILL COUNTY 529 OLD ROMEO RD, ROMEOVILLE, IL
TITLE	**100-YEAR RELATIVE SURROGATE CONCENTRATIONS**

SCALE AT ANSI A 1:4,000	DRAWN	DZF	04/21/2023
	CHECKED	BAS	04/21/2023
BAS PROJECT No. 21141501		FIGURE: **16**	



LEGEND

- ● SITE MONITORING WELL
- ▭ MODEL BOUNDARY
- ⬚ APPROXIMATE SITE BOUNDARY
- — RELATIVE SURROGATE CONCENTRATIONS

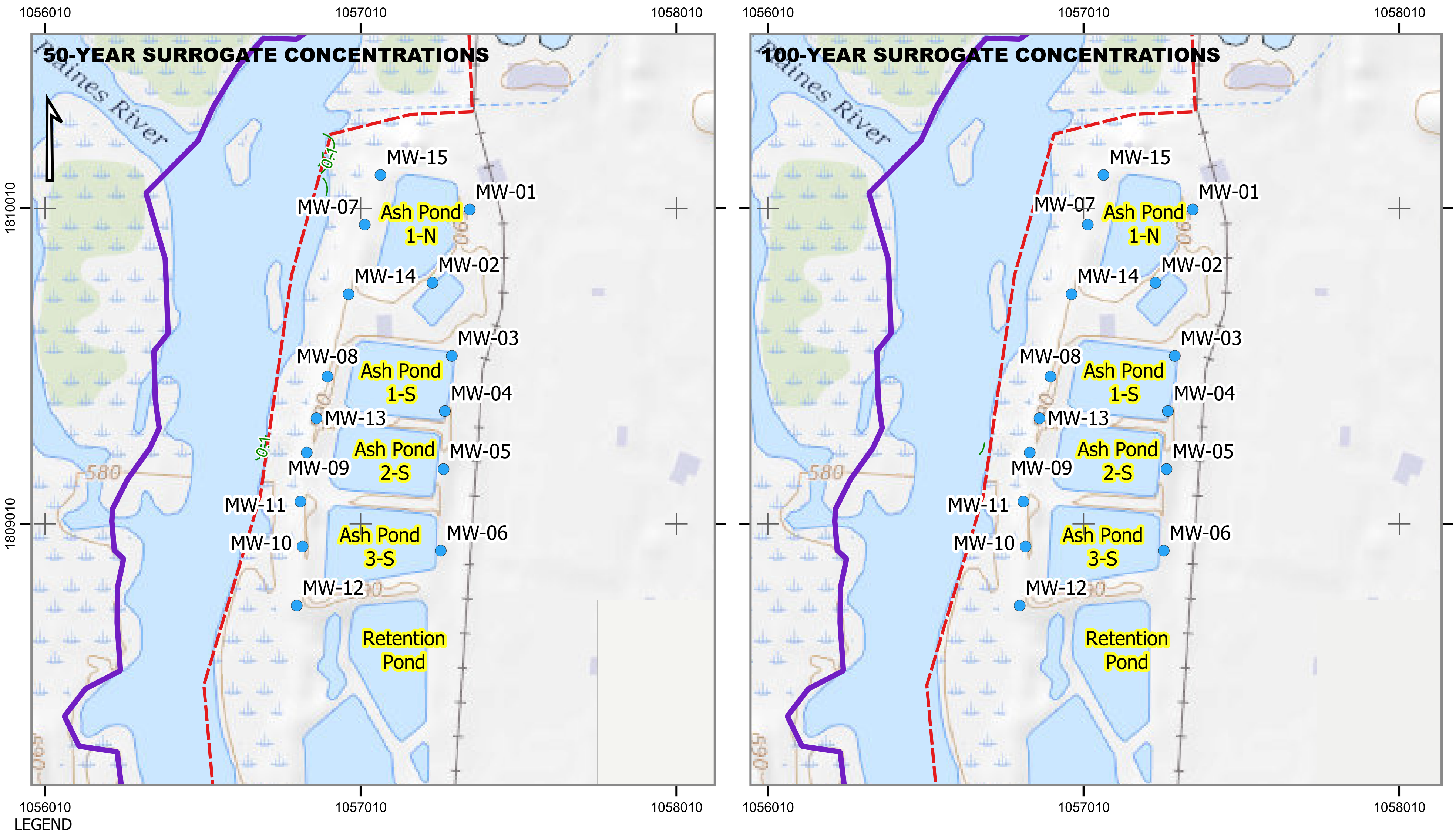
Maximum relative concentrations above competent bedrock

0 200 400 ft
FEET

Coordinate System:
NAD_1983_StatePlane_Illinois_East_FIPS_1201_Feet
Project File:
Figure17_RelativeSurrogateConcentrations_5_25_Years_Scenario1.qgz

CLIENT	MIDWEST GENERATION
SITE	WILL COUNTY 529 OLD ROMEO RD, ROMEOVILLE, IL
TITLE	**RELATIVE SURROGATE CONCENTRATIONS AT 5 AND 25 YEARS, SCENARIO 1**

SCALE AT ANSI A	DRAWN	DZF	04/21/2023
1:5,400	CHECKED	BAS	04/21/2023
BAS PROJECT No.	21141501	FIGURE:	**17**



LEGEND

- ● SITE MONITORING WELL
- ▭ MODEL BOUNDARY
- ▭ APPROXIMATE SITE BOUNDARY
- — RELATIVE SURROGATE CONCENTRATIONS

Maximum relative concentrations above competent bedrock

0 200 400 ft

FEET

Coordinate System:
NAD_1983_StatePlane_Illinois_East_FIPS_1201_Feet
Project File:
Figure18_RelativeSurrogateConcentrations_50_100_Years_Scenario1.qgz

CLIENT
MIDWEST
GENERATION

SITE
WILL COUNTY
529 OLD ROMEO RD, ROMEOVILLE, IL

TITLE
RELATIVE SURROGATE CONCENTRATIONS
AT 50 AND 100 YEARS, SCENARIO 1

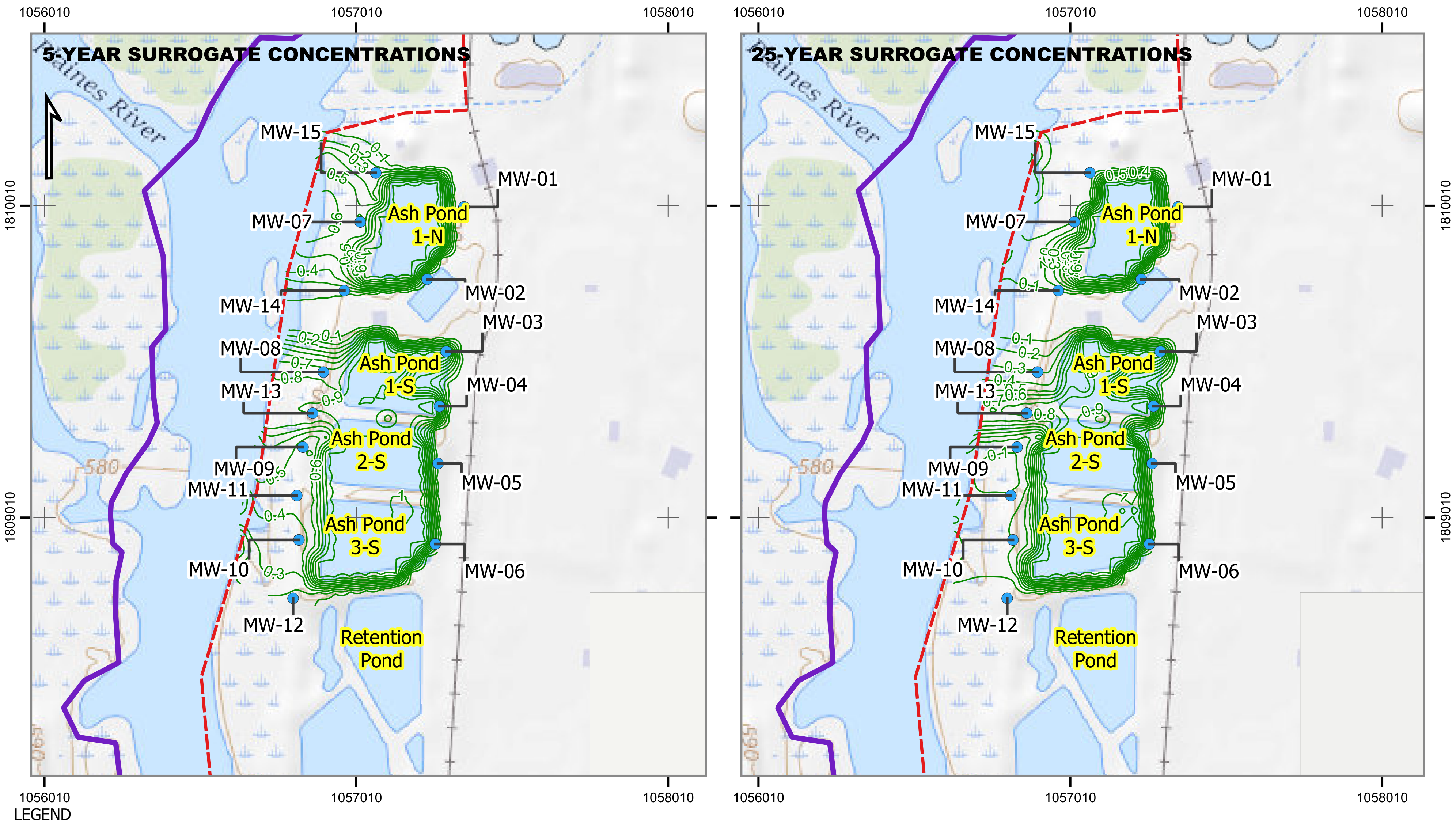
SCALE AT ANSI A
1:5,400

DRAWN *DZF* 04/21/2023

CHECKED *BAS* 04/21/2023

BAS PROJECT No.
21141501

FIGURE:
18



LEGEND

- ● SITE MONITORING WELL
- ▭ MODEL BOUNDARY
- ⬚ APPROXIMATE SITE BOUNDARY
- — RELATIVE SURROGATE CONCENTRATIONS

Maximum relative concentrations above competent bedrock

BAS GROUNDWATER CONSULTING

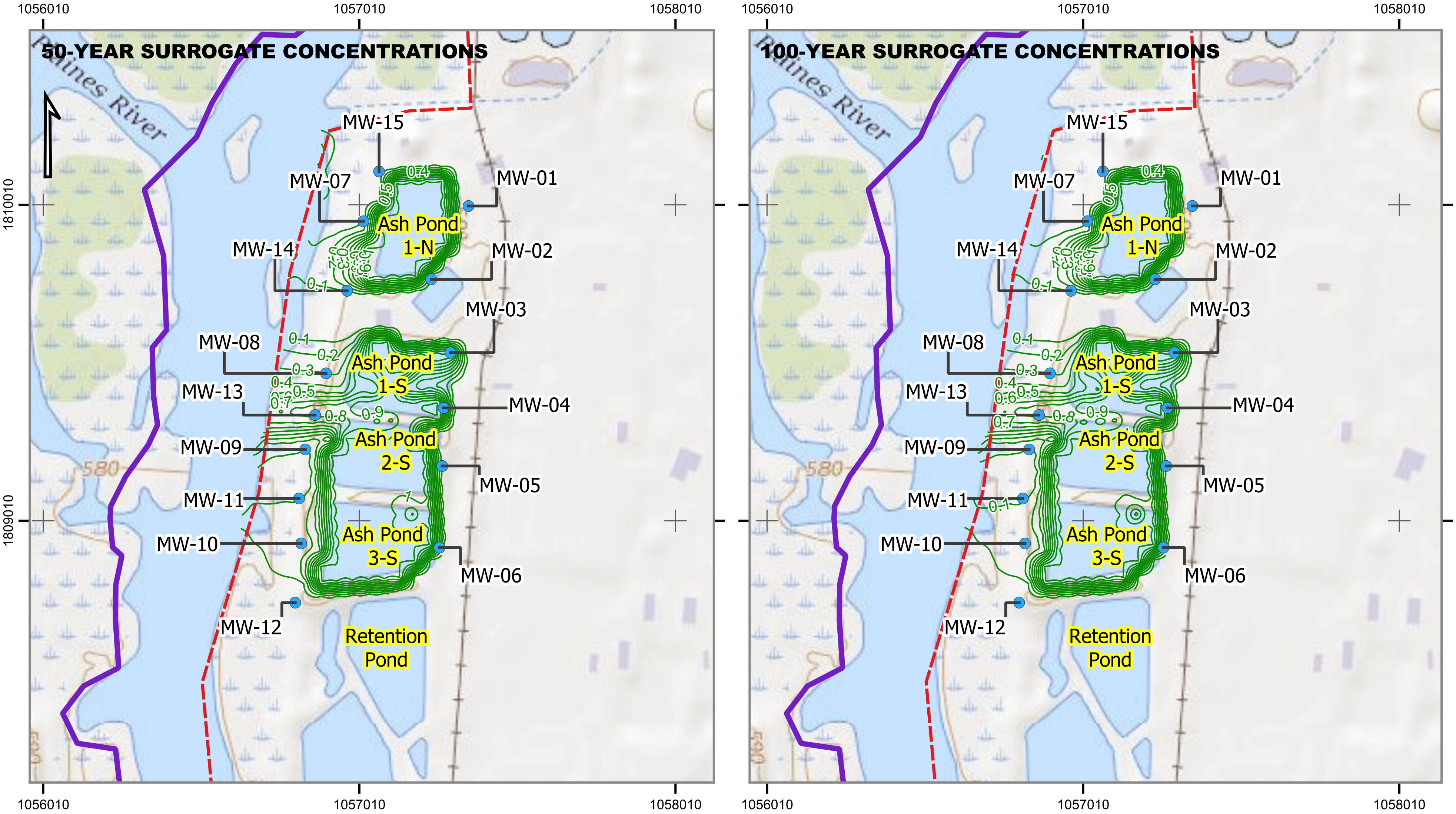
K P R G

0 200 400 ft

FEET

Coordinate System:
NAD_1983_StatePlane_Illinois_East_FIPS_1201_Feet
Project File:
Figure19_RelativeSurrogateConcentrations_5_25_Years_Scenario2.qgz

CLIENT	MIDWEST GENERATION		
SITE	WILL COUNTY 529 OLD ROMEO RD, ROMEOVILLE, IL		
TITLE	**RELATIVE SURROGATE CONCENTRATIONS AT 5 AND 25 YEARS, SCENARIO 2**		
SCALE AT ANSI A 1:5,400	DRAWN	DZF	04/21/2023
	CHECKED	BAS	04/21/2023
BAS PROJECT No. 21141501	FIGURE: **19**		



LEGEND

● SITE MONITORING WELL

▭ MODEL BOUNDARY

▭ APPROXIMATE SITE BOUNDARY

— RELATIVE SURROGATE CONCENTRATIONS

Maximum relative concentrations above competent bedrock

BAS GROUNDWATER CONSULTING

K P R G

0 200 400 ft
FEET

Coordinate System:
NAD_1983_StatePlane_Illinois_East_FIPS_1201_Feet
Project File:
Figure20_RelativeSurrogateConcentrations_50_100_Years_Scenario2.qgz

CLIENT
MIDWEST GENERATION

SITE
WILL COUNTY
529 OLD ROMEO RD, ROMEOVILLE, IL

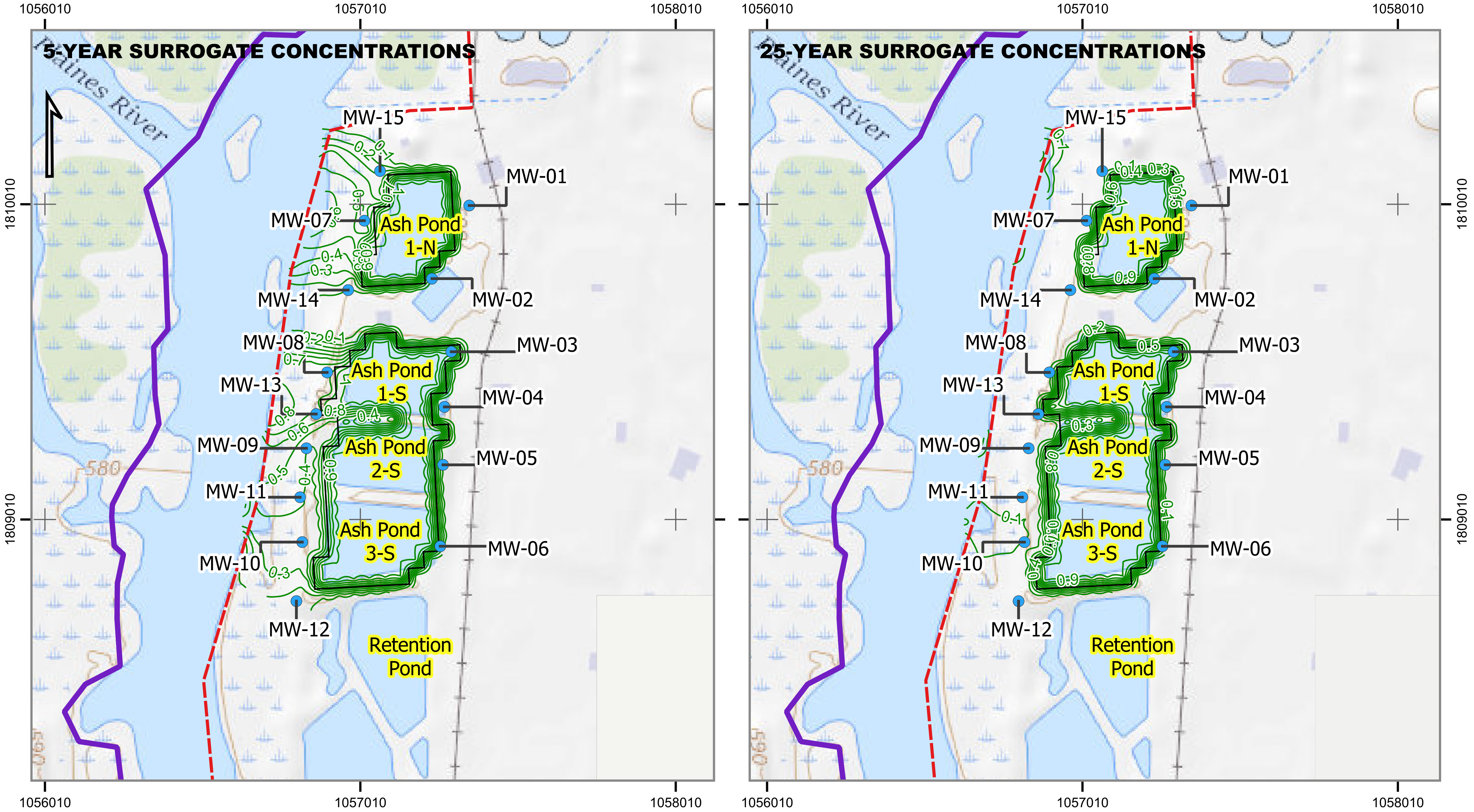
TITLE
RELATIVE SURROGATE CONCENTRATIONS AT 50 AND 100 YEARS, SCENARIO 2

SCALE AT ANSI A
1:5,400

DRAWN	DZF	04/21/2023
CHECKED	BAS	04/21/2023

BAS PROJECT No.
21141501

FIGURE:
20



LEGEND

- ● SITE MONITORING WELL
- ▭ MODEL BOUNDARY
- ▭ APPROXIMATE SITE BOUNDARY
- — AREA OF BARRIER WALL
- — RELATIVE SURROGATE CONCENTRATIONS

Maximum relative concentrations above competent bedrock

BAS GROUNDWATER CONSULTING

K P R G

0 200 400 ft

FEET

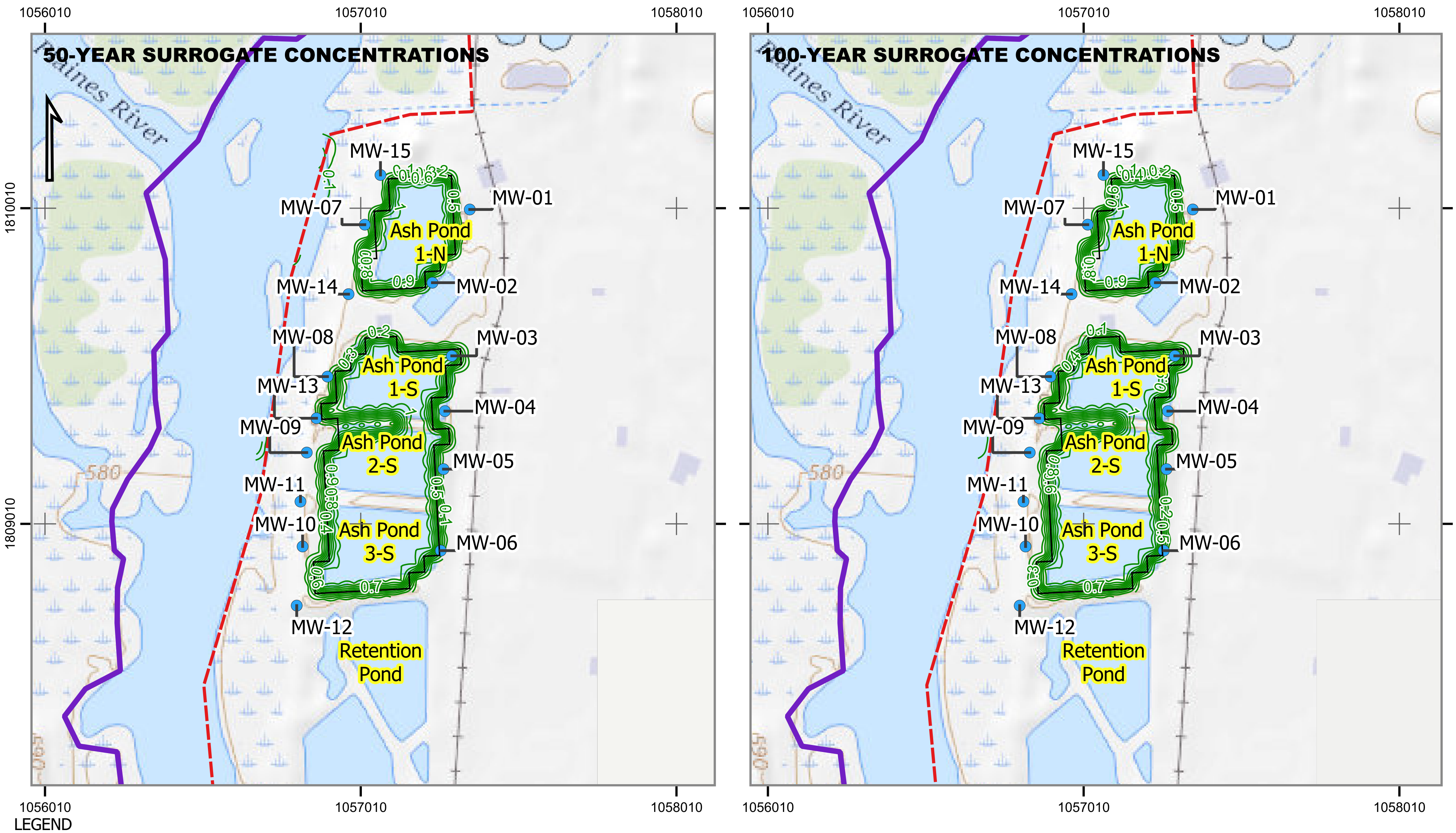
Coordinate System:
NAD_1983_StatePlane_Illinois_East_FIPS_1201_Feet
Project File:
Figure22_RelativeSurrogateConcentrations_5_25_Years_Scenario3.qgz

CLIENT
MIDWEST GENERATION

SITE
WILL COUNTY
529 OLD ROMEO RD, ROMEOVILLE, IL

TITLE
RELATIVE SURROGATE CONCENTRATIONS AT 5 AND 25 YEARS, SCENARIO 3

SCALE AT ANSI A 1:5,400	DRAWN	DZF	04/21/2023
	CHECKED	BAS	04/21/2023
BAS PROJECT No. 21141501	FIGURE: **22**		



LEGEND

● SITE MONITORING WELL

▭ MODEL BOUNDARY

▭ APPROXIMATE SITE BOUNDARY

— AREA OF BARRIER WALL

— RELATIVE SURROGATE CONCENTRATIONS

Maximum relative concentrations above competent bedrock

BAS GROUNDWATER CONSULTING

K P R G

0 200 400 ft

FEET

Coordinate System:
NAD_1983_StatePlane_Illinois_East_FIPS_1201_Feet
Project File:
Figure23_RelativeSurrogateConcentrations_50_100_Years_Scenario3.qgz

CLIENT
MIDWEST GENERATION

SITE
WILL COUNTY
529 OLD ROMEO RD, ROMEOVILLE, IL

TITLE
RELATIVE SURROGATE CONCENTRATIONS AT 50 AND 100 YEARS, SCENARIO 3

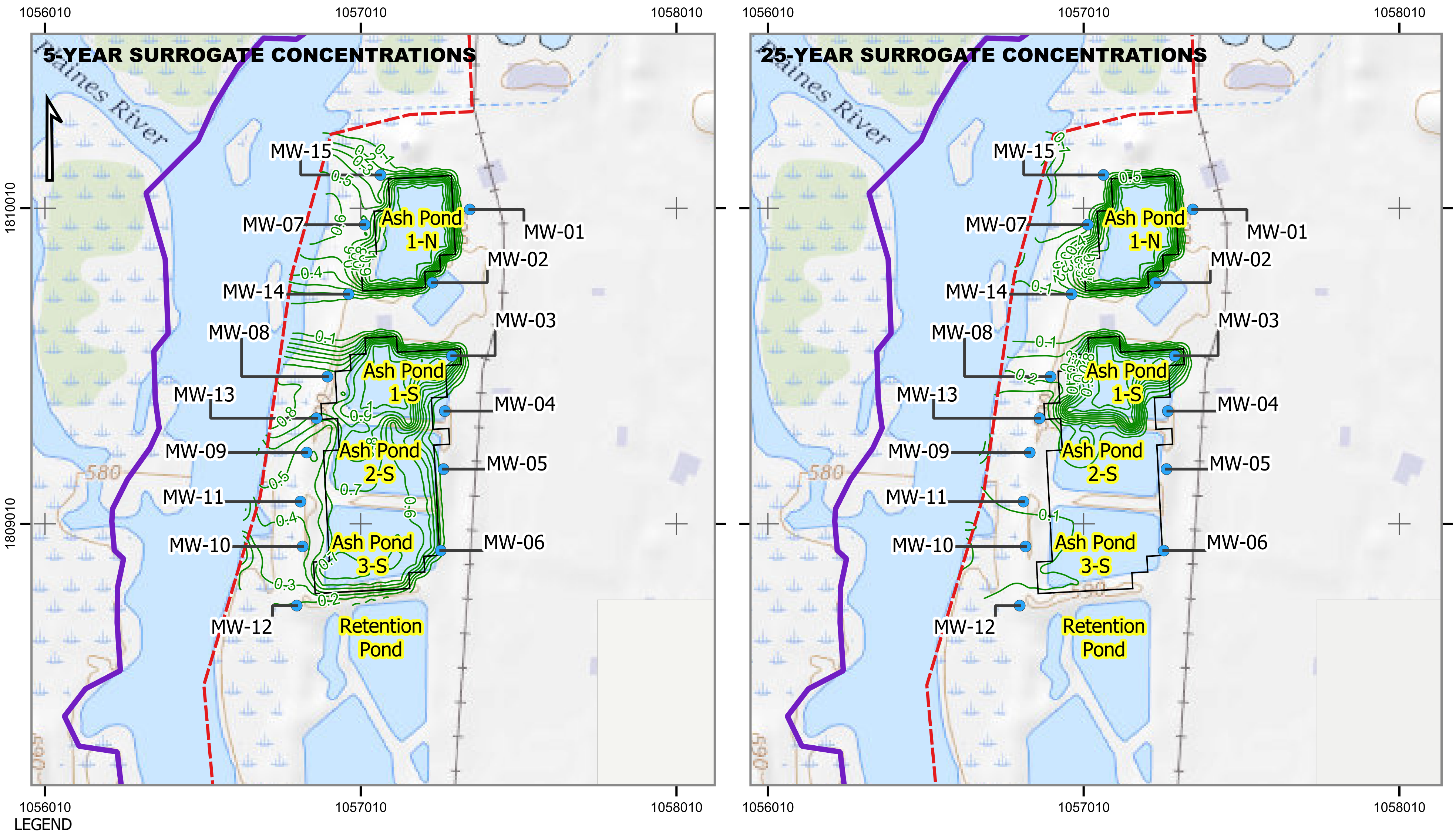
SCALE AT ANSI A
1:5,400

DRAWN DZF 04/21/2023

CHECKED BAS 04/21/2023

BAS PROJECT No.
21141501

FIGURE:
23



LEGEND

● SITE MONITORING WELL

▭ MODEL BOUNDARY

▭ APPROXIMATE SITE BOUNDARY

— AREA OF BARRIER WALL

— RELATIVE SURROGATE CONCENTRATIONS

Maximum relative concentrations above competent bedrock

BAS GROUNDWATER CONSULTING

KPRG

0 200 400 ft
FEET

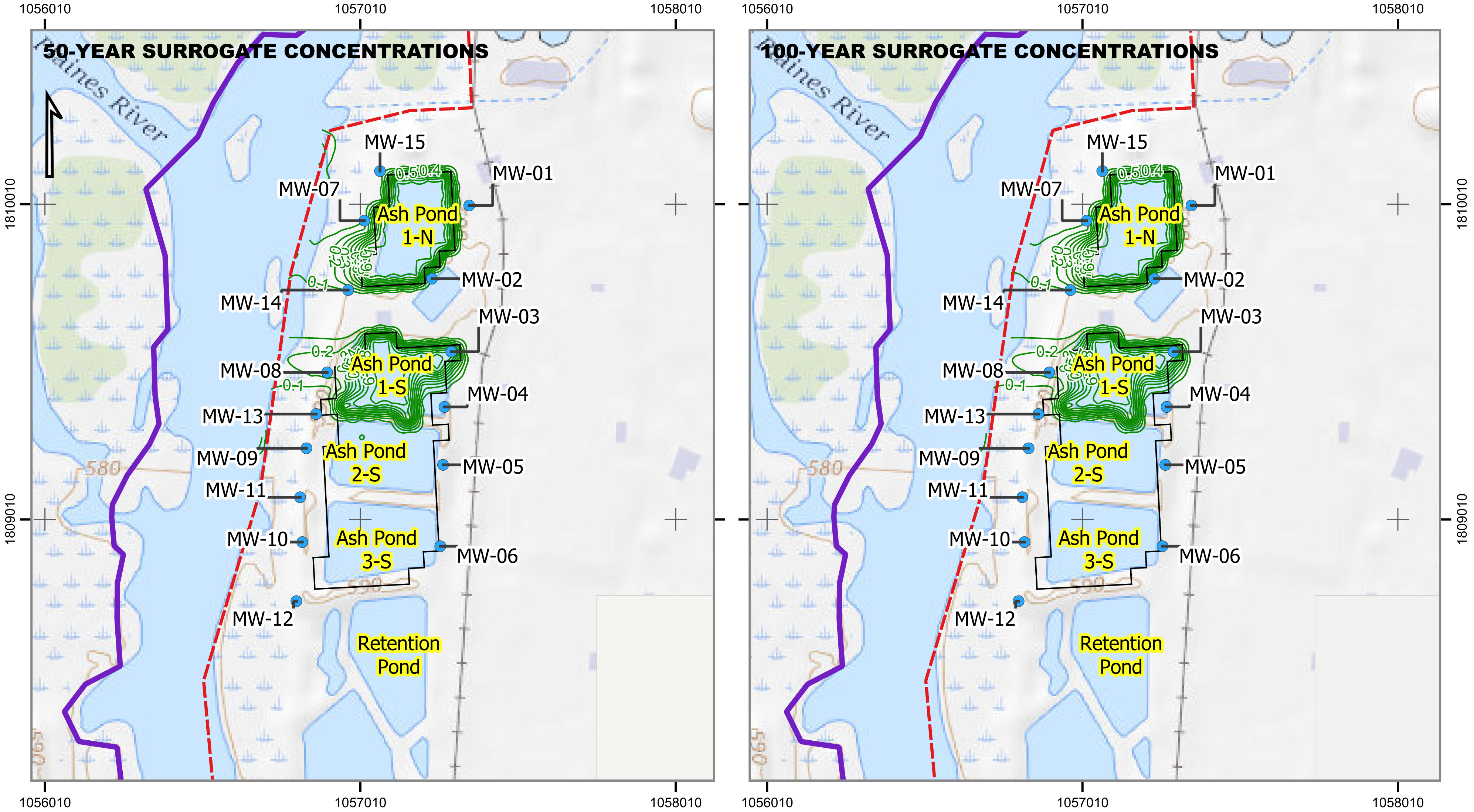
Coordinate System:
NAD_1983_StatePlane_Illinois_East_FIPS_1201_Feet
Project File:
Figure24_RelativeSurrogateConcentrations_5_25_Years_Scenario4.qgz

CLIENT
MIDWEST
GENERATION

SITE
WILL COUNTY
529 OLD ROMEO RD, ROMEOVILLE, IL

TITLE
RELATIVE SURROGATE CONCENTRATIONS AT 5 AND 25 YEARS, SCENARIO 4

SCALE AT ANSI A 1:5,400	DRAWN	DZF	05/09/2023
	CHECKED	BAS	05/09/2023
BAS PROJECT No. 21141501	FIGURE: **24**		



LEGEND

● SITE MONITORING WELL

▭ MODEL BOUNDARY

▭ APPROXIMATE SITE BOUNDARY

— AREA OF BARRIER WALL

— RELATIVE SURROGATE CONCENTRATIONS

Maximum relative concentrations above competent bedrock

BAS GROUNDWATER CONSULTING

K P R G

0 200 400 ft

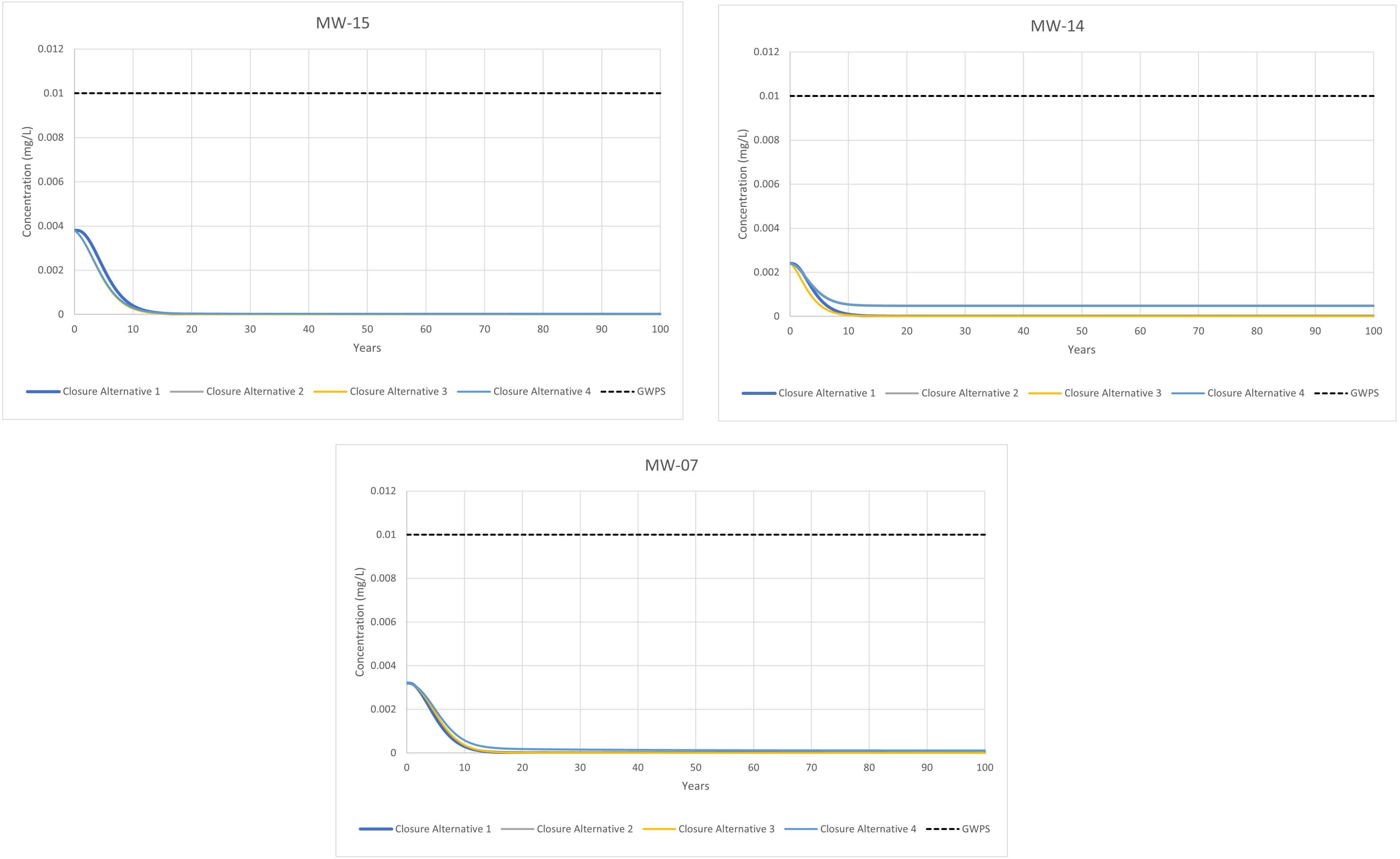
FEET

Coordinate System:
NAD_1983_StatePlane_Illinois_East_FIPS_1201_Feet
Project File:
Figure25_RelativeSurrogateConcentrations_50_100_Years_Scenario4.qgz

CLIENT	MIDWEST GENERATION		
SITE	WILL COUNTY 529 OLD ROMEO RD, ROMEOVILLE, IL		
TITLE	**RELATIVE SURROGATE CONCENTRATIONS AT 50 AND 100 YEARS, SCENARIO 4**		
SCALE AT ANSI A 1:5,400	*DRAWN*	*DZF*	04/21/2023
	CHECKED	*BAS*	04/21/2023
BAS PROJECT No. *21141501*	*FIGURE:* **25**		

.

ATTACHMENT 2



BAS GROUNDWATER CONSULTING

KPRG

CLIENT
MIDWEST
GENERATION

SITE
WILL COUNTY
529 OLD ROMEO RD, ROMEOVILLE, IL

TITLE
ARSENIC CONCENTRATIONS OVER TIME,
POND 1N DOWNGRADIENT WELLS

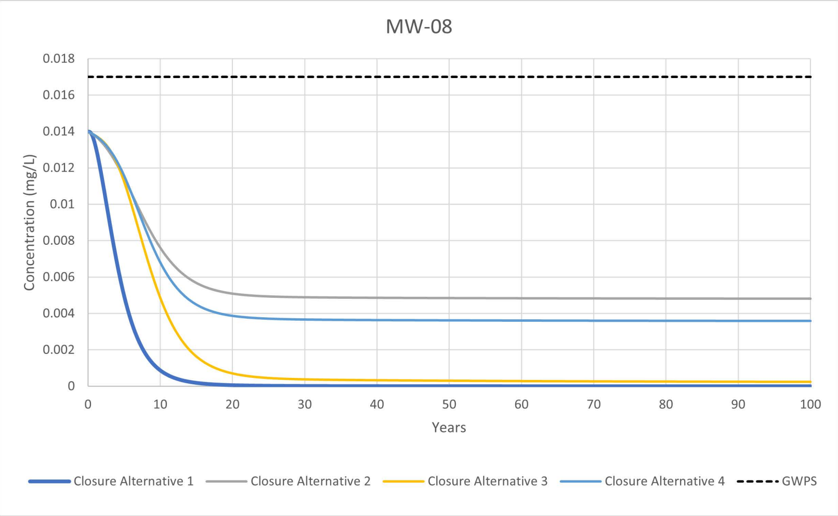
SCALE AT ANSI A

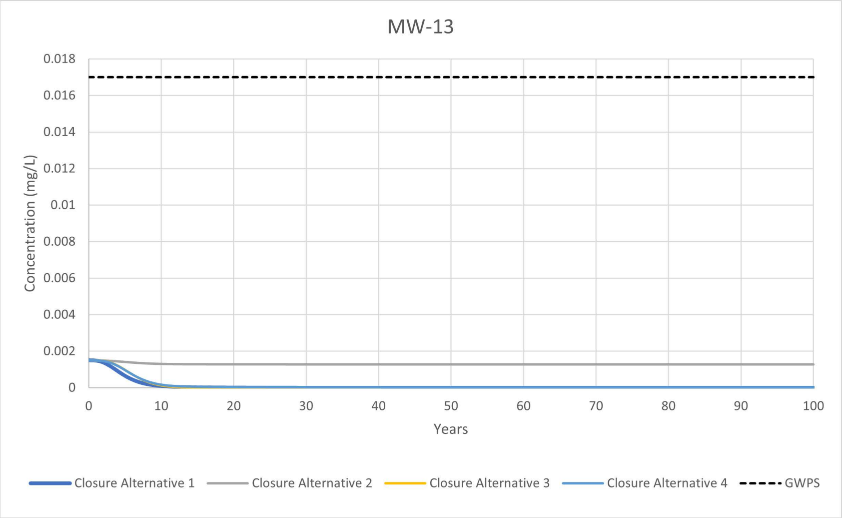
DRAWN	DZF	03/20/2023
CHECKED	BAS	03/20/2023

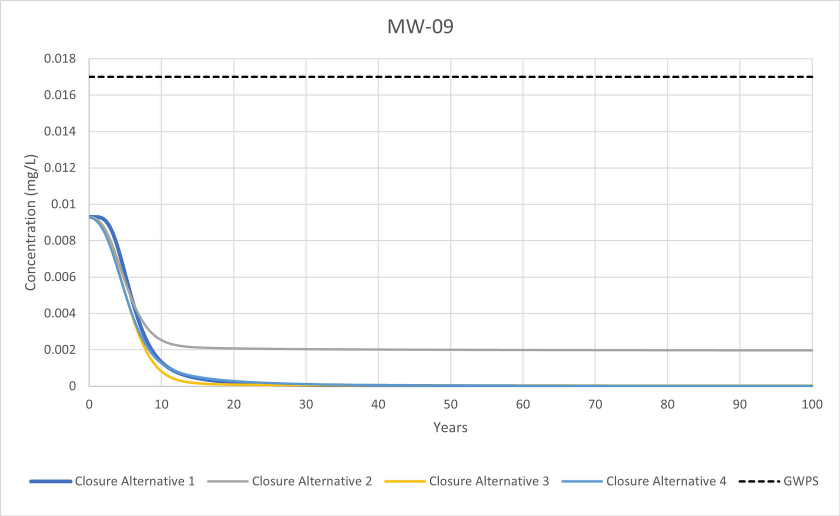
BAS PROJECT No.
21141501

FIGURE:
27

Project File: Figure27_ArsenicConcentrations.qgz







BAS GROUNDWATER CONSULTING

KPRG

SCALE AT ANSI A

DRAWN DZF 03/20/2023

CHECKED BAS 03/20/2023

BAS PROJECT No.
21141501

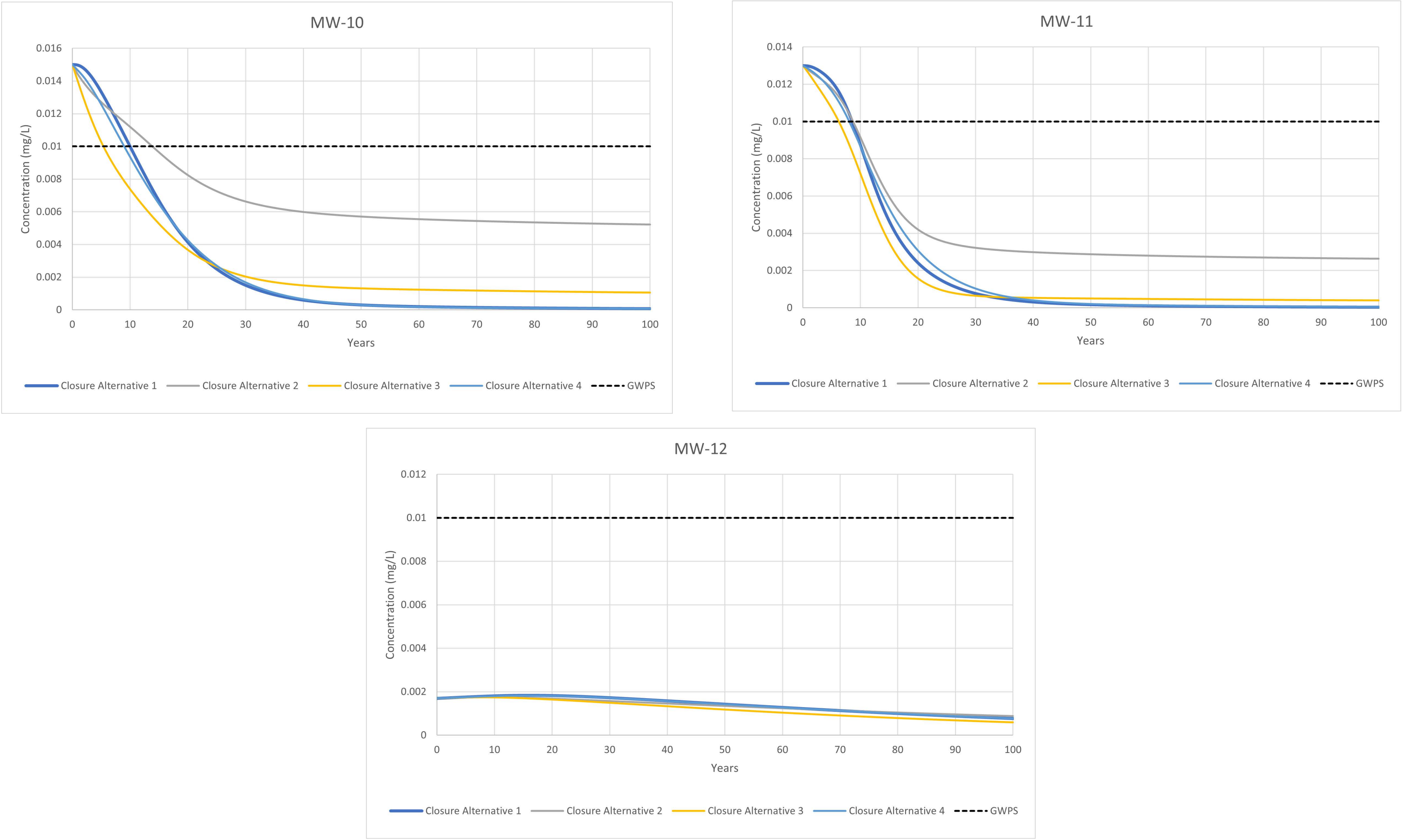
FIGURE:
28

CLIENT
MIDWEST
GENERATION

SITE
WILL COUNTY
529 OLD ROMEO RD, ROMEOVILLE, IL

TITLE
ARSENIC CONCENTRATIONS OVER TIME, POND 1S DOWNGRADIENT WELLS

Project File: Figure28_ArsenicConcentrations1S.qgz



BAS GROUNDWATER CONSULTING

KPRG

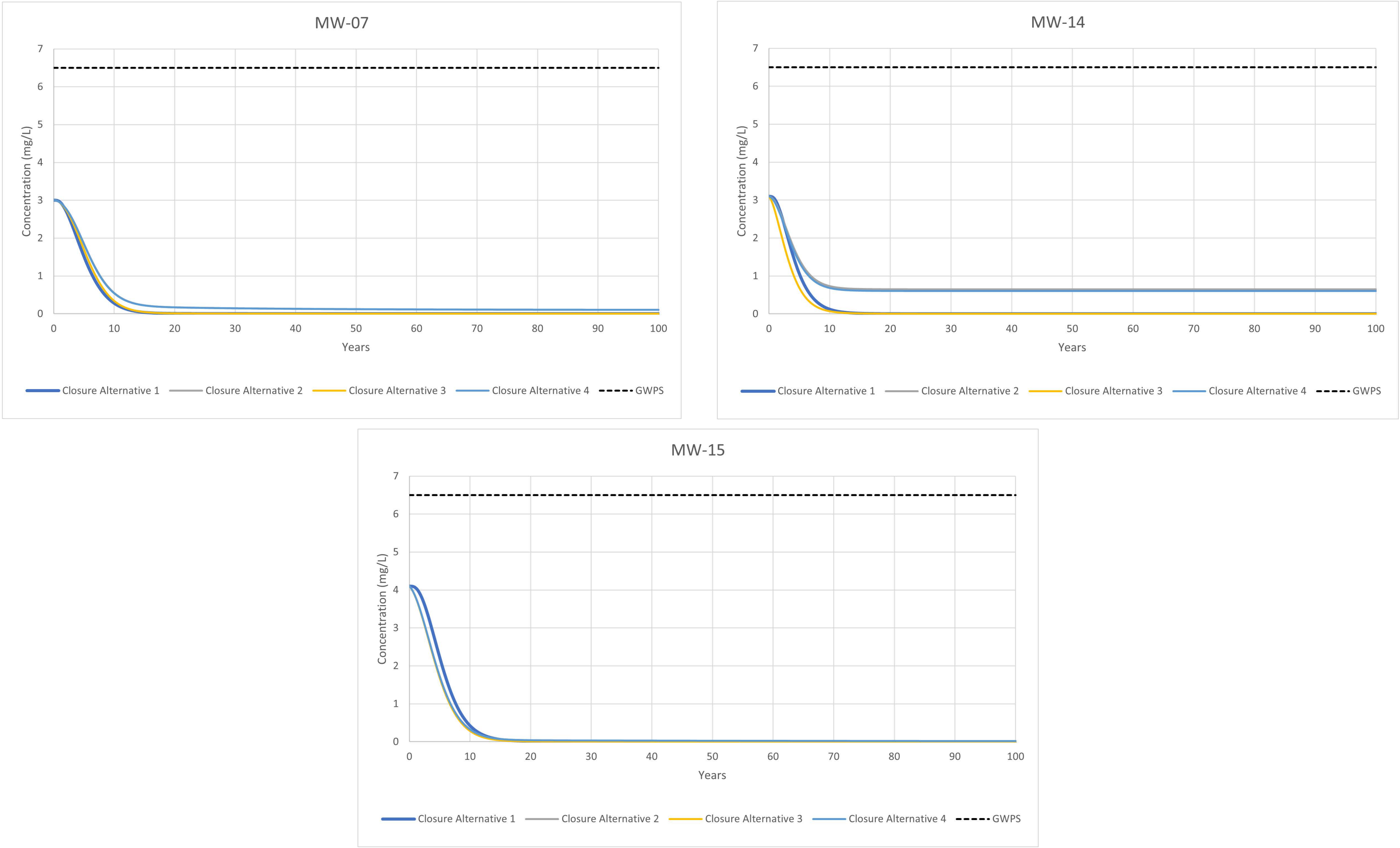
SCALE AT ANSI A	*DRAWN*	*DZF*	03/20/2023
	CHECKED	*BAS*	03/20/2023
BAS PROJECT No. *21141501*		*FIGURE:* **29**	

CLIENT
MIDWEST
GENERATION

SITE
WILL COUNTY
529 OLD ROMEO RD, ROMEOVILLE, IL

TITLE
ARSENIC CONCENTRATIONS OVER TIME, PONDS 2S/3S DOWNGRADIENT WELLS

Project File: Figure29_ArsenicConcentrations2S3S.qgz



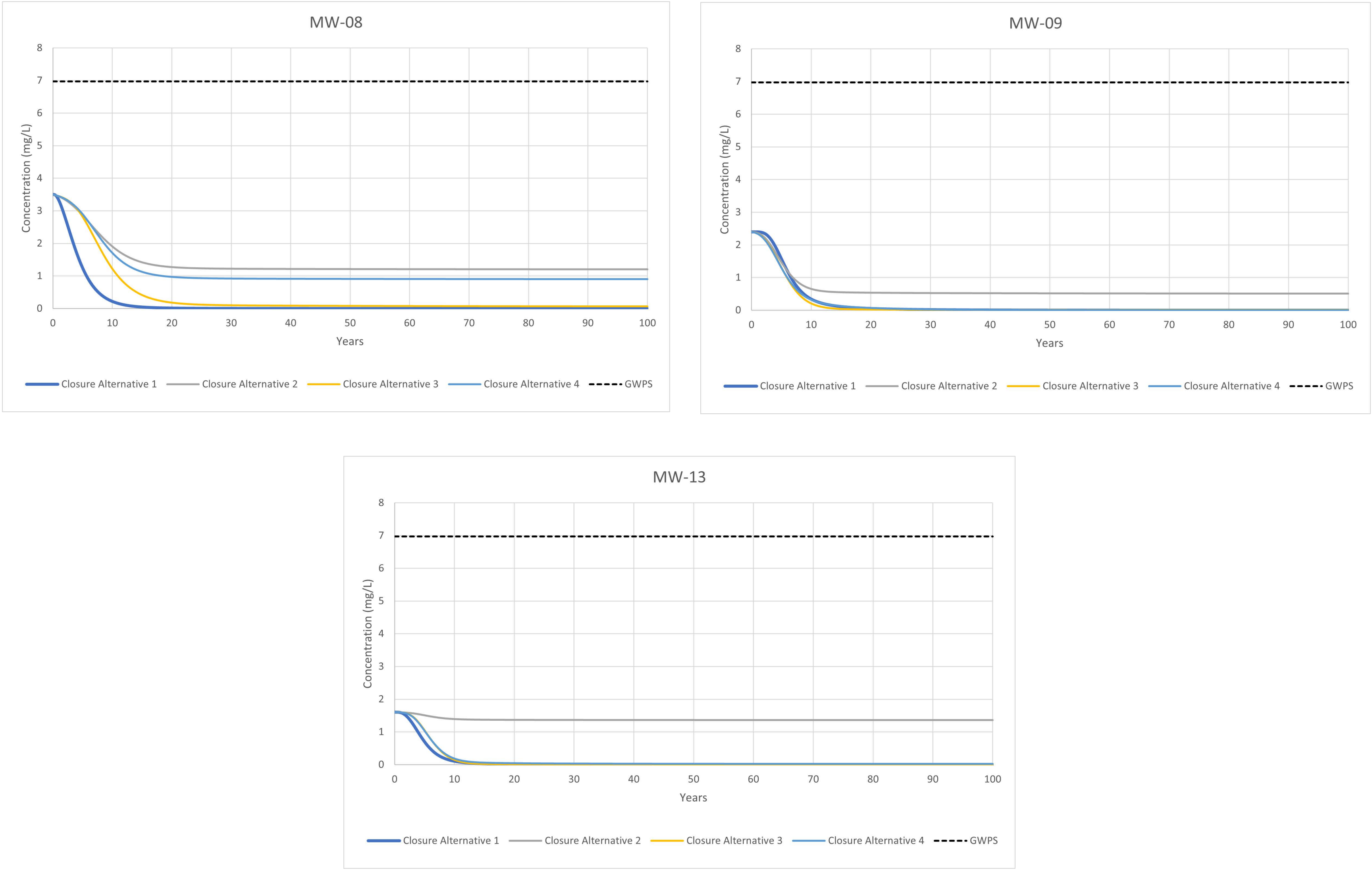
SCALE AT ANSI A	*DRAWN*	*DZF*	03/20/2023
	CHECKED	*BAS*	03/20/2023
BAS PROJECT No. *21141501*		*FIGURE:* **30**	

CLIENT
MIDWEST
GENERATION

SITE
WILL COUNTY
529 OLD ROMEO RD, ROMEOVILLE, IL

TITLE
BORON CONCENTRATIONS OVER TIME,
POND 1N DOWNGRADIENT WELLS

Project File: Figure30_BoronConcentrations1N.qgz



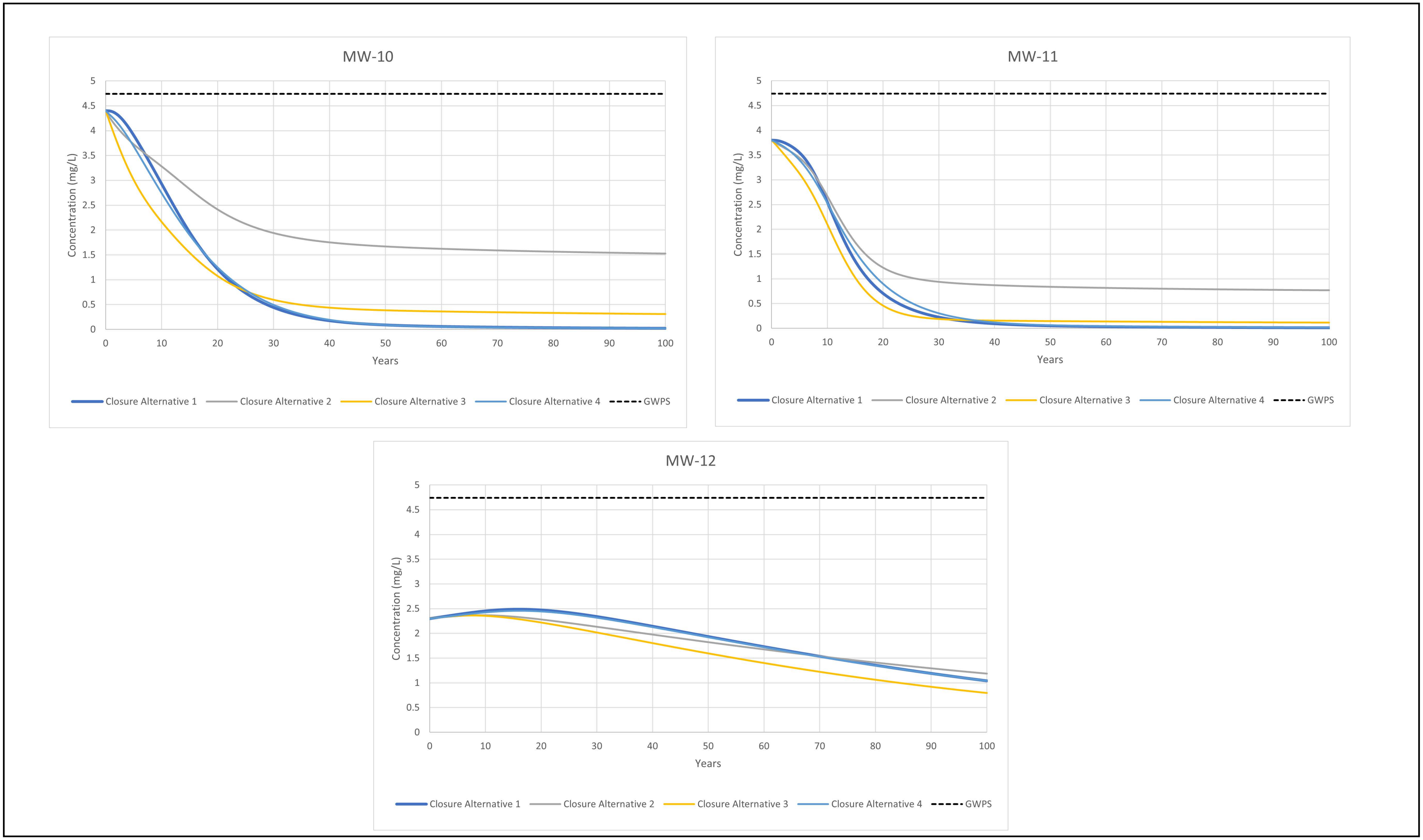
SCALE AT ANSI A	DRAWN	DZF	03/20/2023
	CHECKED	BAS	03/20/2023
BAS PROJECT No. 21141501		FIGURE: **31**	

CLIENT
MIDWEST
GENERATION

SITE
WILL COUNTY
529 OLD ROMEO RD, ROMEOVILLE, IL

TITLE
BORON CONCENTRATIONS OVER TIME,
POND 1S DOWNGRADIENT WELLS

Project File: Figure31_BoronConcentrations1S.qgz



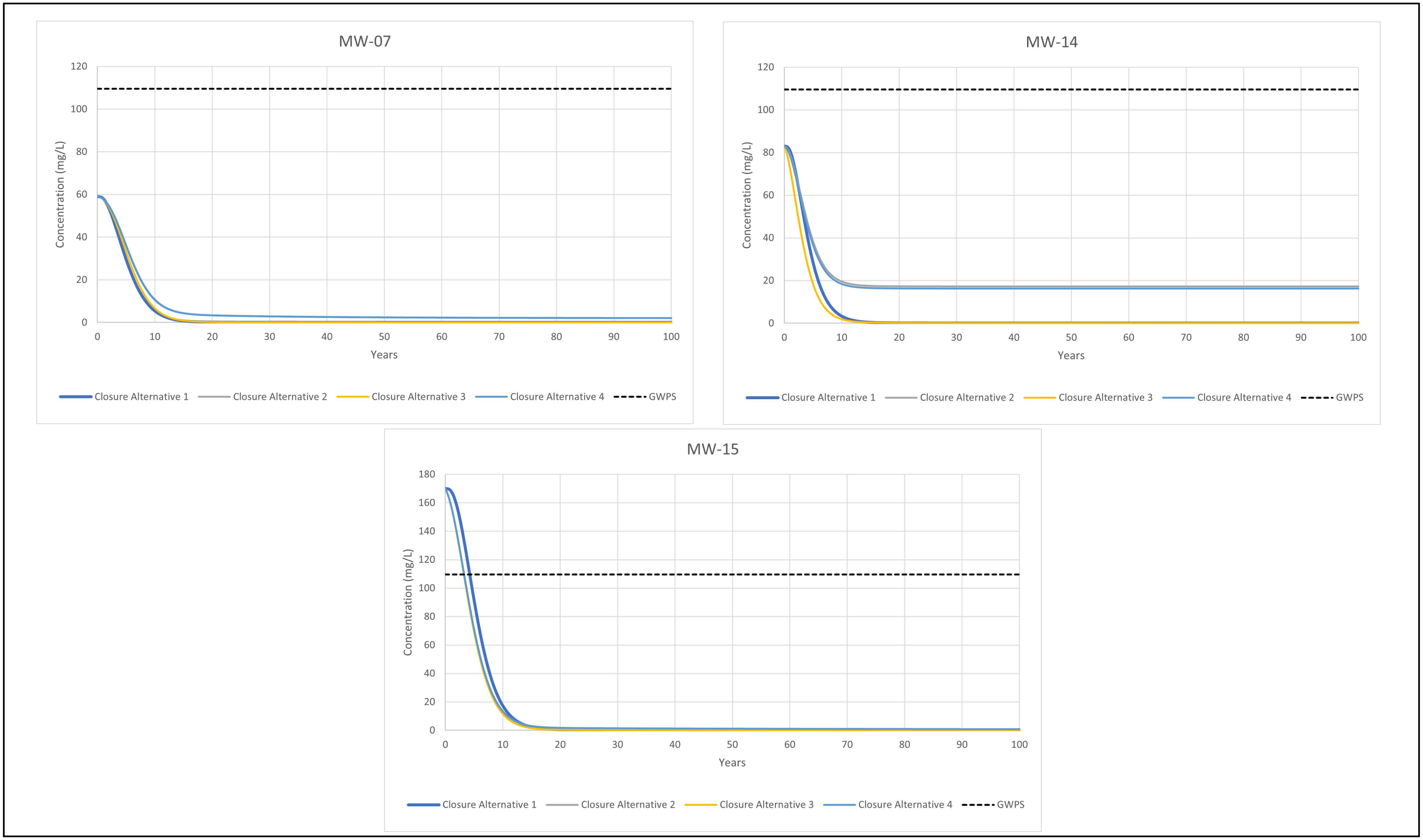
SCALE AT ANSI A	DRAWN	DZF	03/20/2023
	CHECKED	BAS	03/20/2023
BAS PROJECT No. 21141501		FIGURE: **32**	

CLIENT
MIDWEST
GENERATION

SITE
WILL COUNTY
529 OLD ROMEO RD, ROMEOVILLE, IL

TITLE
BORON CONCENTRATIONS OVER TIME,
POND 2S/3S DOWNGRADIENT WELLS

Project File: Figure32_BoronConcentrations2S3S.qgz



BAS GROUNDWATER CONSULTING

KPRG

CLIENT
MIDWEST GENERATION

SITE
WILL COUNTY
529 OLD ROMEO RD, ROMEOVILLE, IL

TITLE
CALCIUM CONCENTRATIONS OVER TIME, POND 1N DOWNGRADIENT WELLS

SCALE AT ANSI A

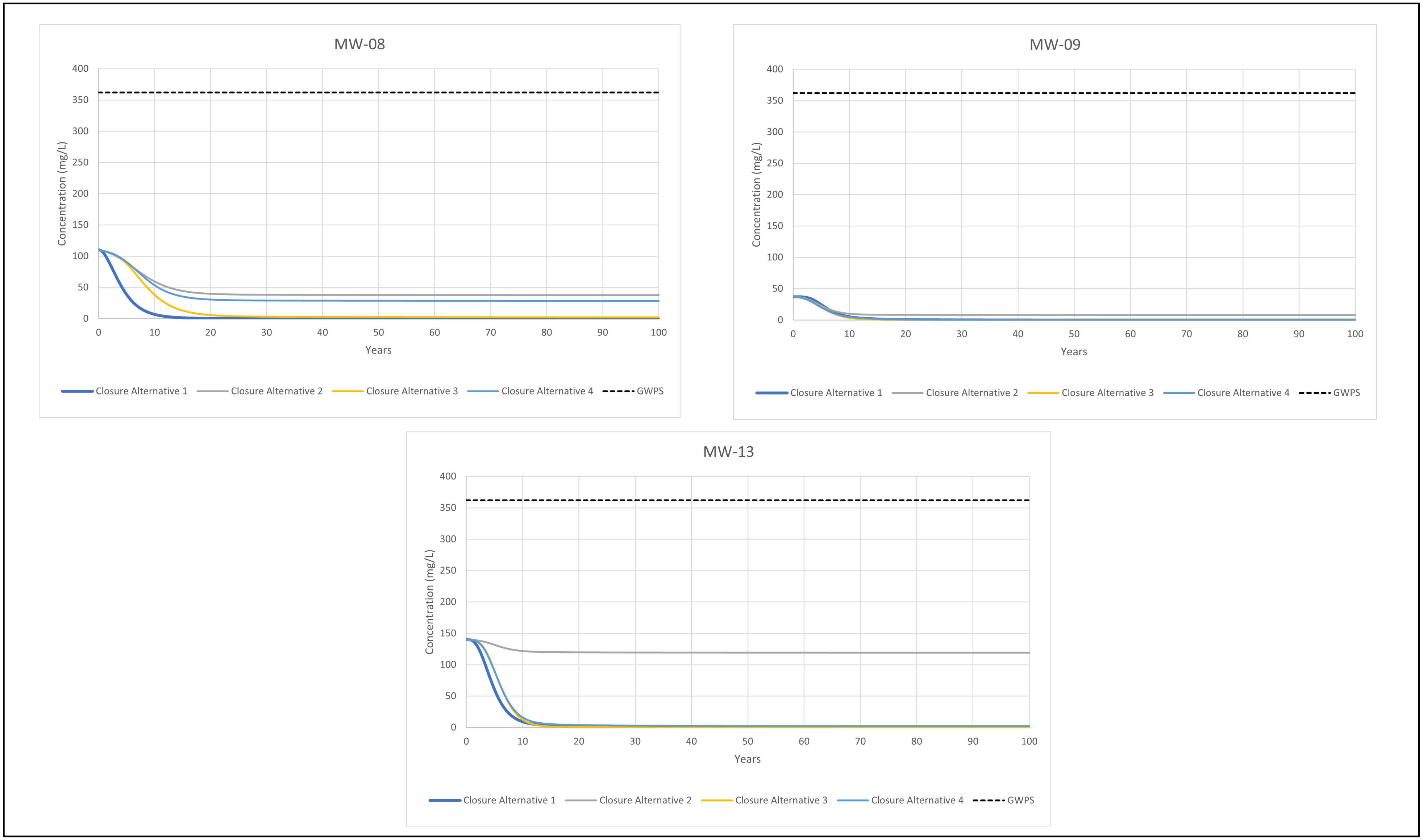
DRAWN DZF 03/20/2023

CHECKED BAS 03/20/2023

BAS PROJECT No.
21141501

FIGURE:
33

Project File: Figure33_CalciumConcentrations1N.qgz



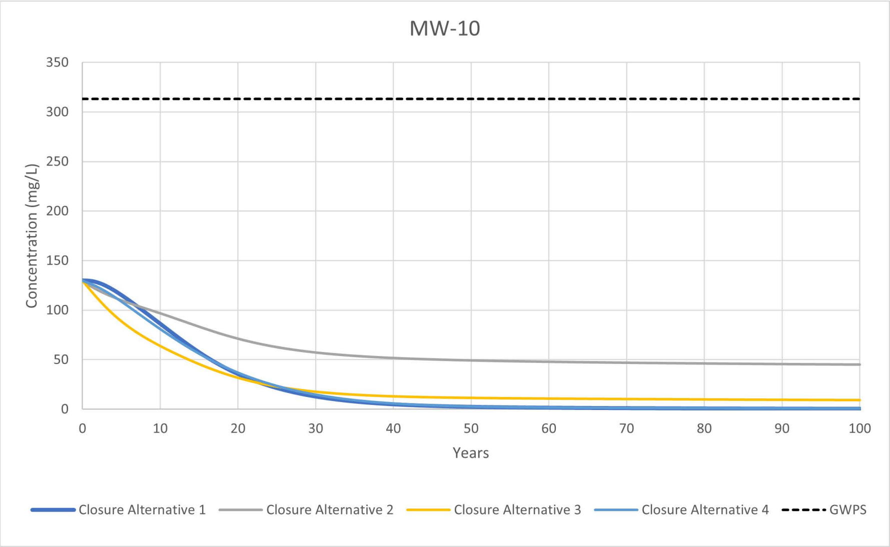
SCALE AT ANSI A	*DRAWN*	*DZF*	03/20/2023
	CHECKED	*BAS*	03/20/2023
BAS PROJECT No. *21141501*		*FIGURE:* **34**	

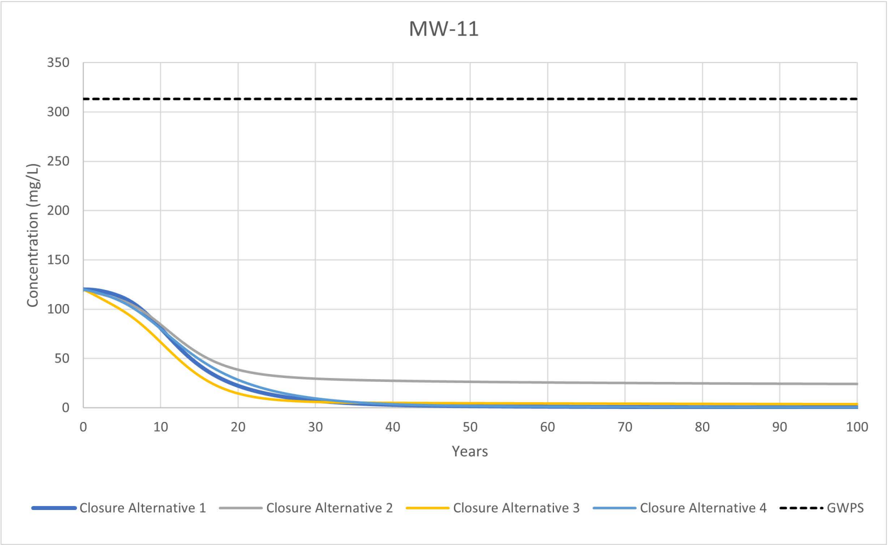
CLIENT
MIDWEST
GENERATION

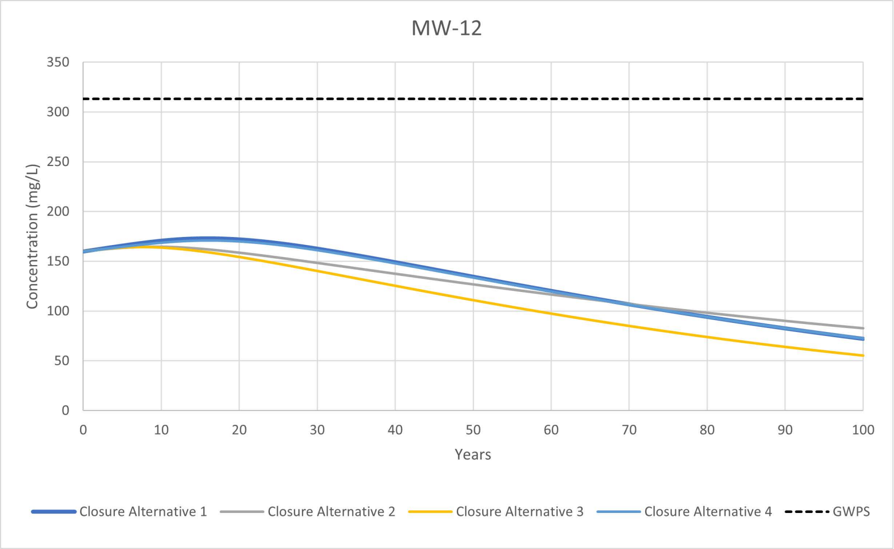
SITE
WILL COUNTY
529 OLD ROMEO RD, ROMEOVILLE, IL

TITLE
CALCIUM CONCENTRATIONS OVER TIME, POND 1S DOWNGRADIENT WELLS

Project File: Figure34_CalciumConcentrations1S.qgz







BAS GROUNDWATER CONSULTING

KPRG

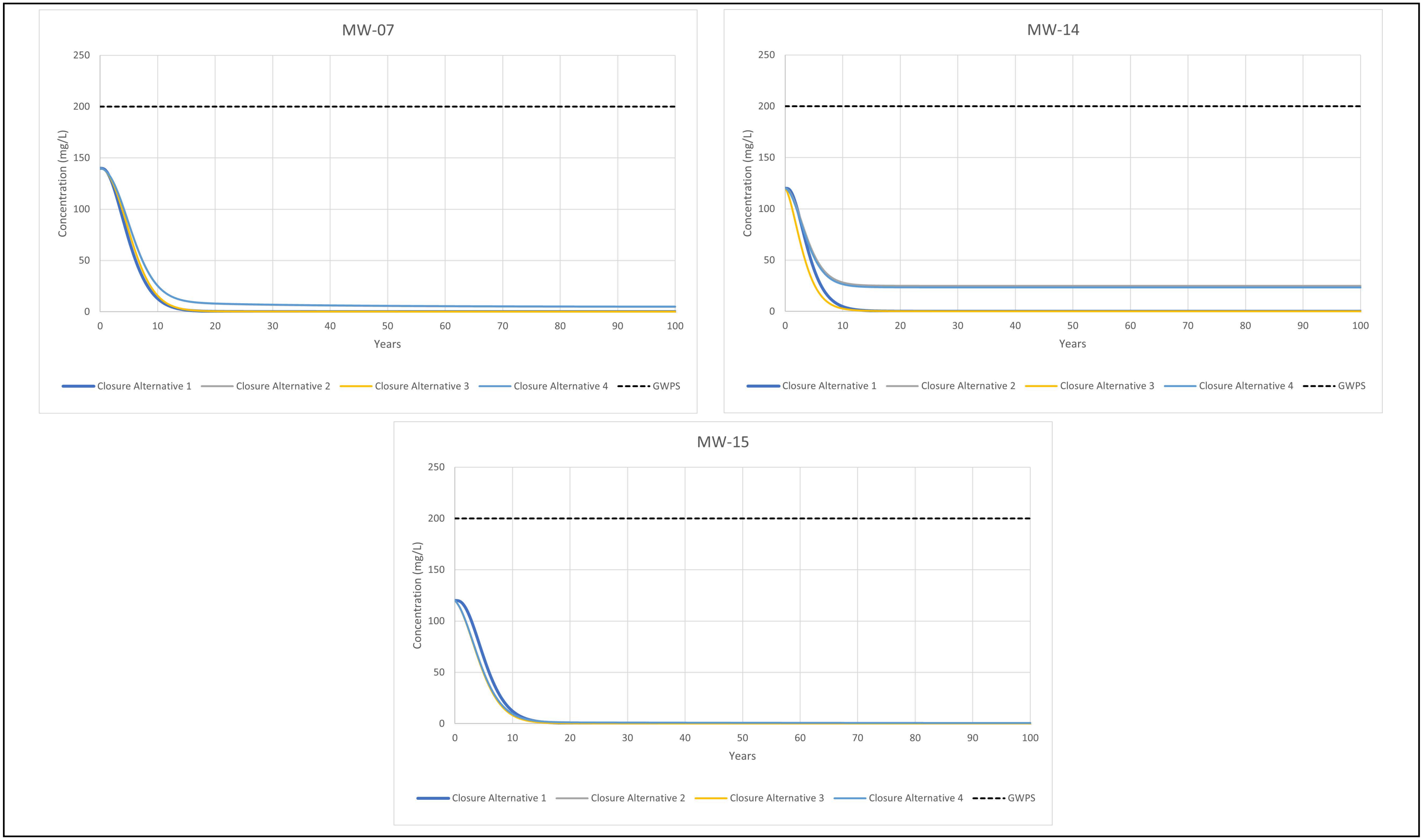
SCALE AT ANSI A	*DRAWN*	*DZF*	*03/20/2023*
	CHECKED	*BAS*	*03/20/2023*
BAS PROJECT No. 21141501		*FIGURE:* **35**	

CLIENT
MIDWEST
GENERATION

SITE
WILL COUNTY
529 OLD ROMEO RD, ROMEOVILLE, IL

TITLE
CALCIUM CONCENTRATIONS OVER TIME, PONDS 2S/3S DOWNGRADIENT WELLS

Project File: Figure35_CalciumConcentrations2S3S.qgz



BAS GROUNDWATER CONSULTING

KPRG

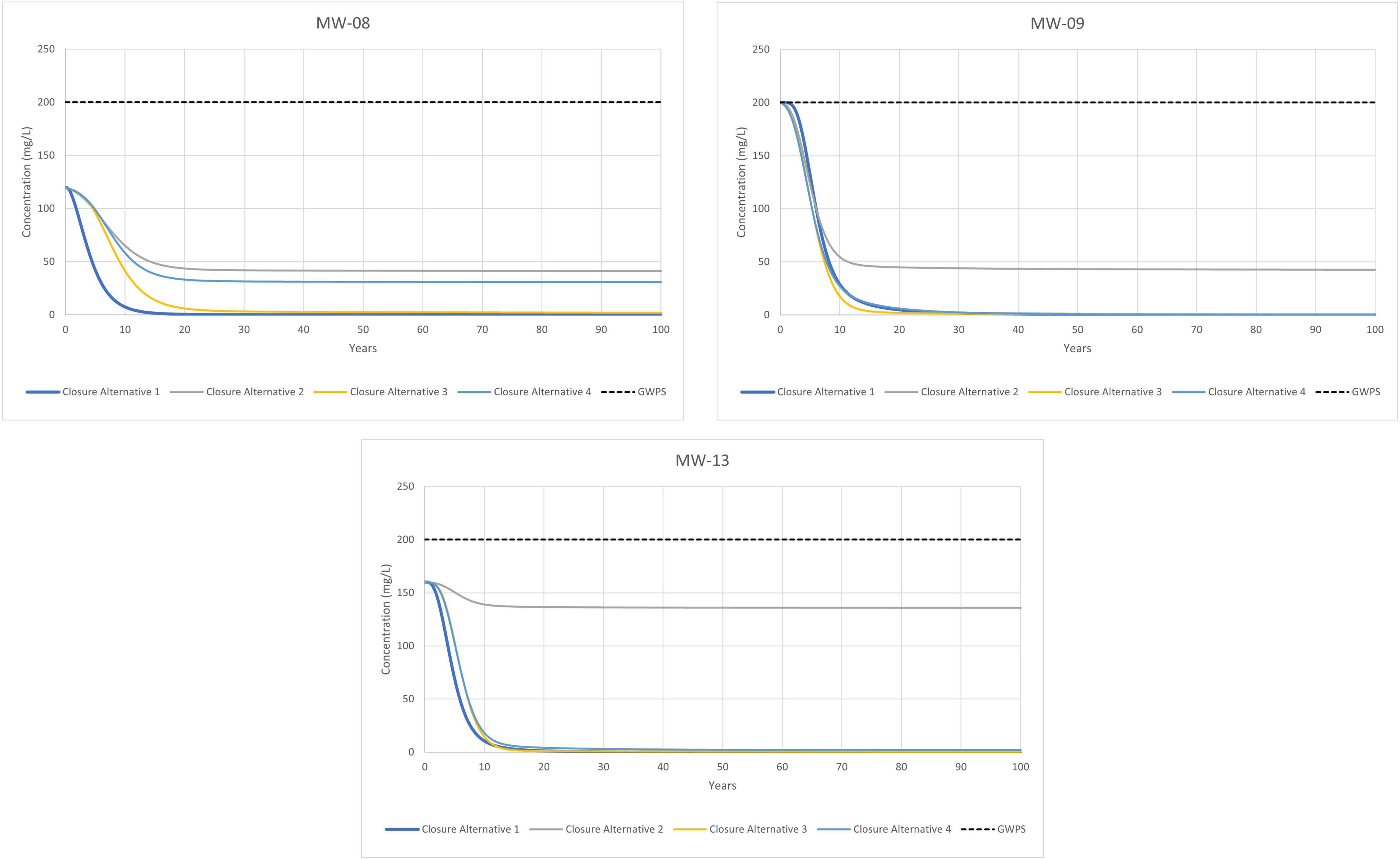
SCALE AT ANSI A	DRAWN	DZF	03/20/2023
	CHECKED	BAS	03/20/2023
BAS PROJECT No. 21141501		FIGURE: **36**	

CLIENT
MIDWEST
GENERATION

SITE
WILL COUNTY
529 OLD ROMEO RD, ROMEOVILLE, IL

TITLE
CHLORIDE CONCENTRATIONS OVER TIME,
POND 1N DOWNGRADIENT WELLS

Project File: Figure36_ChlorideConcentrations1N.qgz



CLIENT
MIDWEST
GENERATION

SITE
WILL COUNTY
529 OLD ROMEO RD, ROMEOVILLE, IL

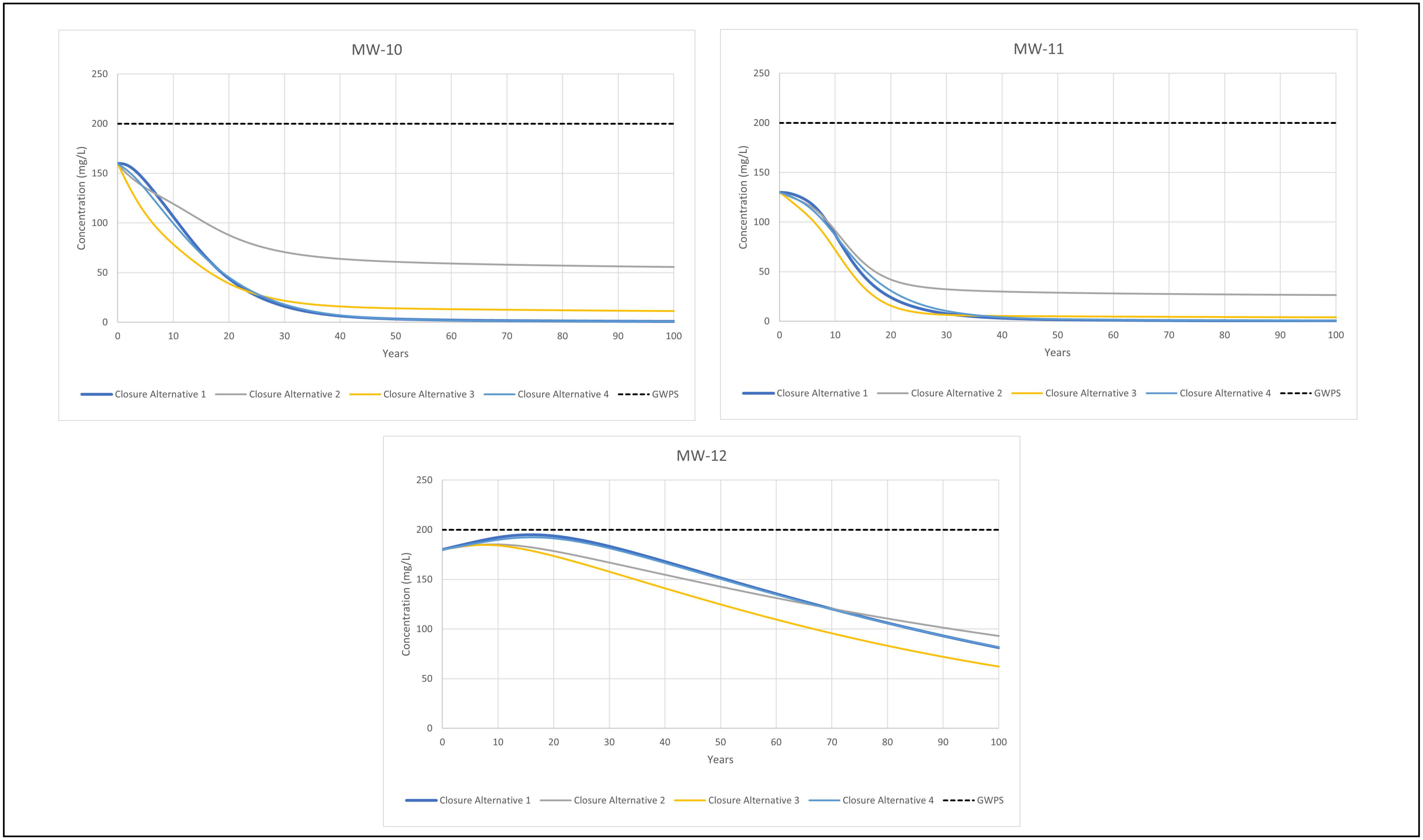
TITLE
**CHLORIDE CONCENTRATIONS OVER TIME,
POND 1S DOWNGRADIENT WELLS**

SCALE AT ANSI A	DRAWN	DZF	03/20/2023
	CHECKED	BAS	03/20/2023

BAS PROJECT No.
21141501

FIGURE:
37

Project File: Figure37_ChlorideConcentrations1S.qgz



BAS GROUNDWATER CONSULTING

KPRG

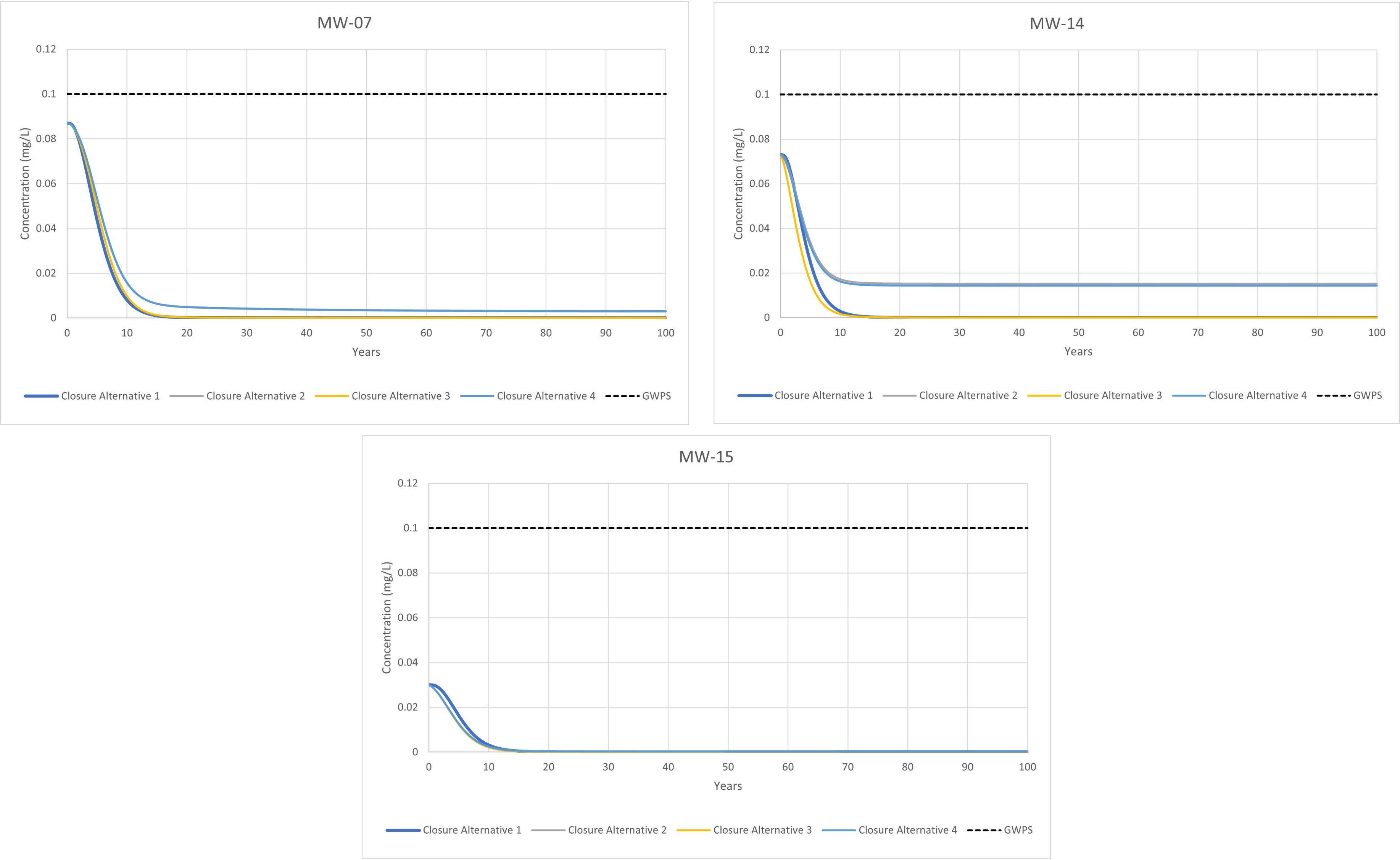
SCALE AT ANSI A	DRAWN	DZF	03/20/2023
	CHECKED	BAS	03/20/2023
BAS PROJECT No. 21141501		FIGURE: 38	

CLIENT
MIDWEST
GENERATION

SITE
WILL COUNTY
529 OLD ROMEO RD, ROMEOVILLE, IL

TITLE
CHLORIDE CONCENTRATIONS OVER TIME,
PONDS 2S/3S DOWNGRADIENT WELLS

Project File: Figure38_ChlorideConcentrations2S3S.qgz



BAS GROUNDWATER CONSULTING

KPRG

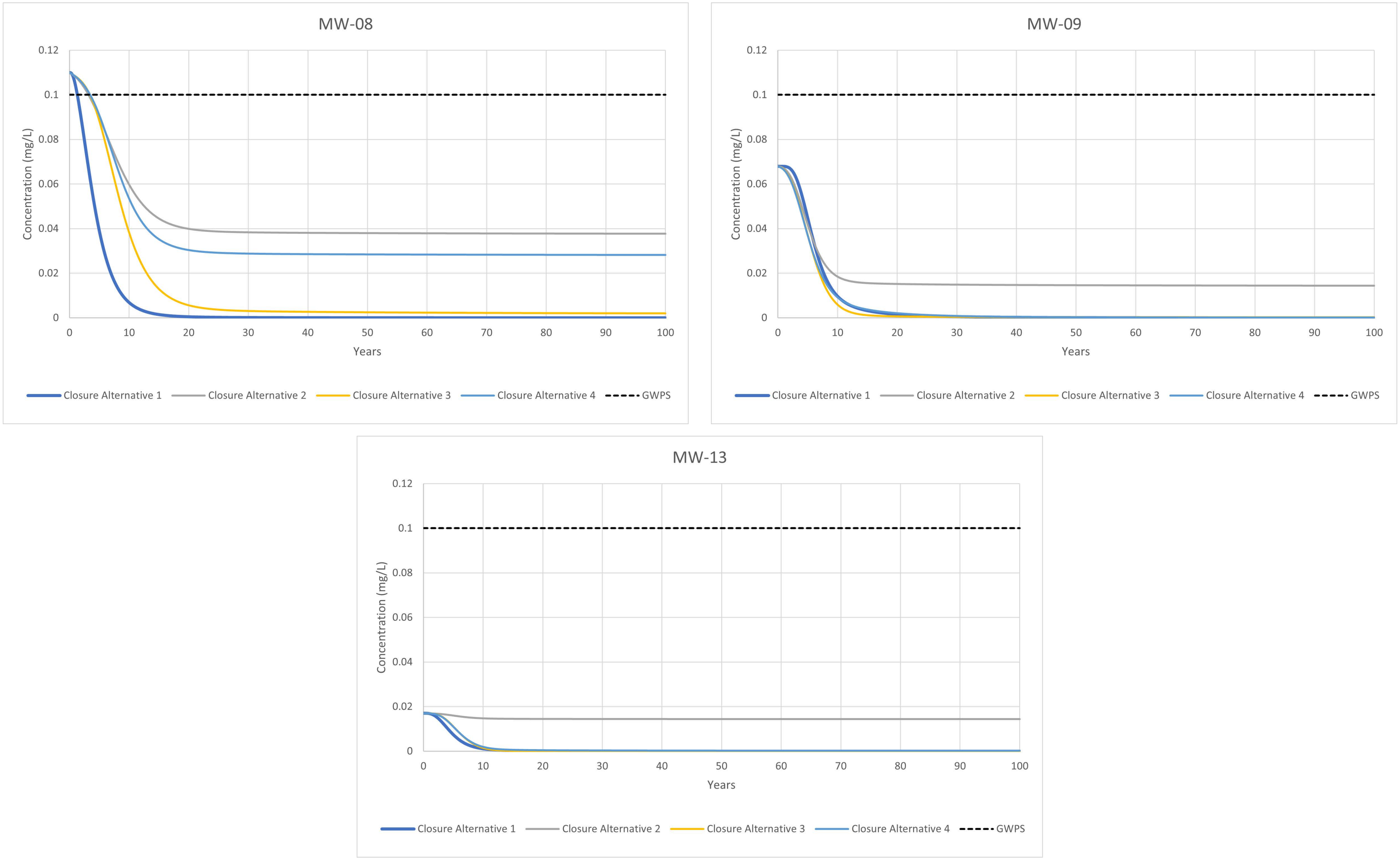
SCALE AT ANSI A
DRAWN DZF 03/20/2023
CHECKED BAS 03/20/2023
BAS PROJECT No. 21141501
FIGURE: 39

CLIENT
MIDWEST GENERATION

SITE
WILL COUNTY
529 OLD ROMEO RD, ROMEOVILLE, IL

TITLE
MOLYBDENUM CONCENTRATIONS OVER TIME, POND 1N DOWNGRADIENT WELLS

Project File: Figure39_MolybdenumConcentrations1N.qgz



BAS GROUNDWATER CONSULTING

KPRG

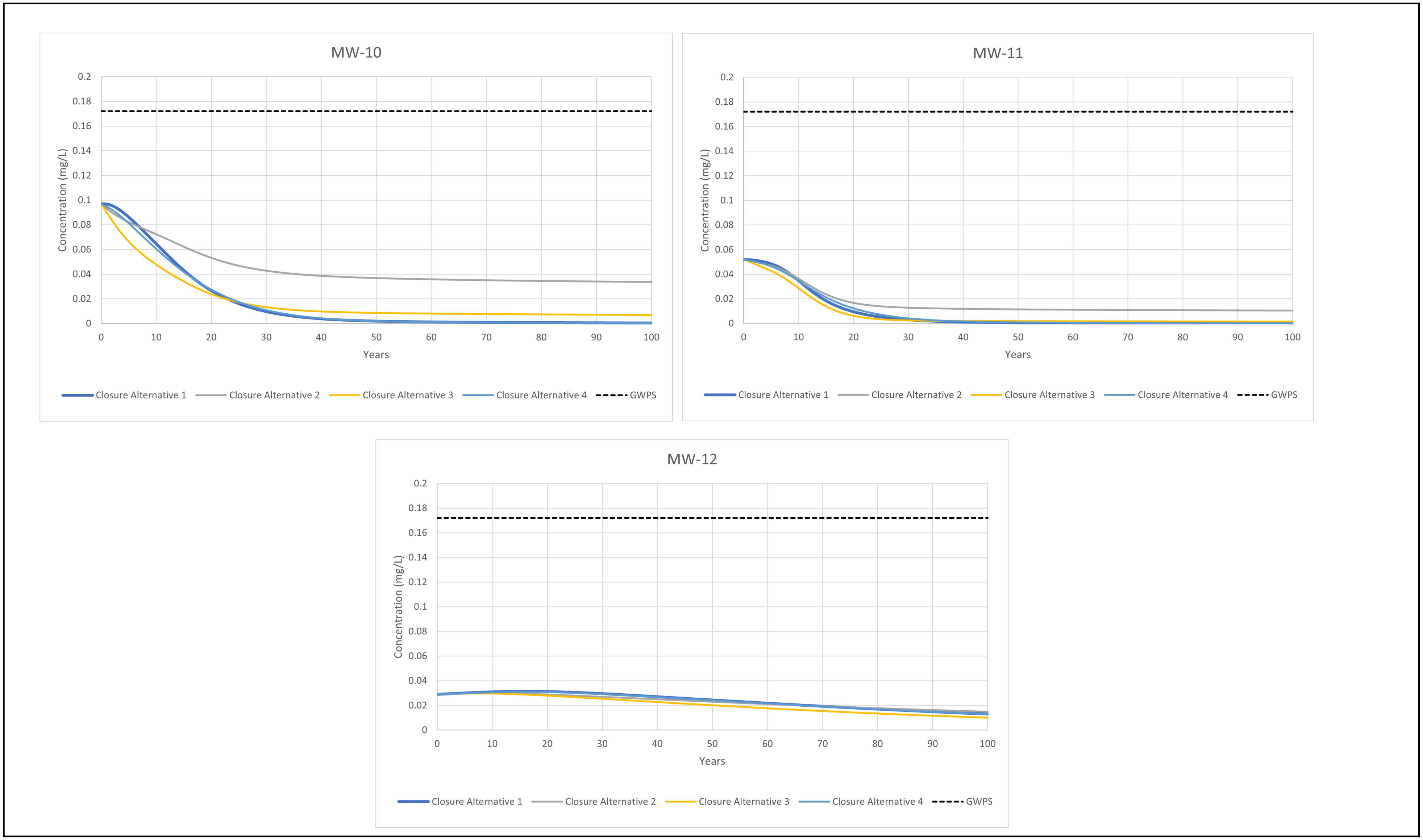
SCALE AT ANSI A	DRAWN	DZF	03/20/2023
	CHECKED	BAS	03/20/2023
BAS PROJECT No. 21141501		FIGURE: **40**	

CLIENT
MIDWEST
GENERATION

SITE
WILL COUNTY
529 OLD ROMEO RD, ROMEOVILLE, IL

TITLE
MOLYBDENUM CONCENTRATIONS OVER TIME, POND 1S DOWNGRADIENT WELLS

Project File: Figure40_MolybdenumConcentrations1S.qgz



BAS GROUNDWATER CONSULTING

KPRG

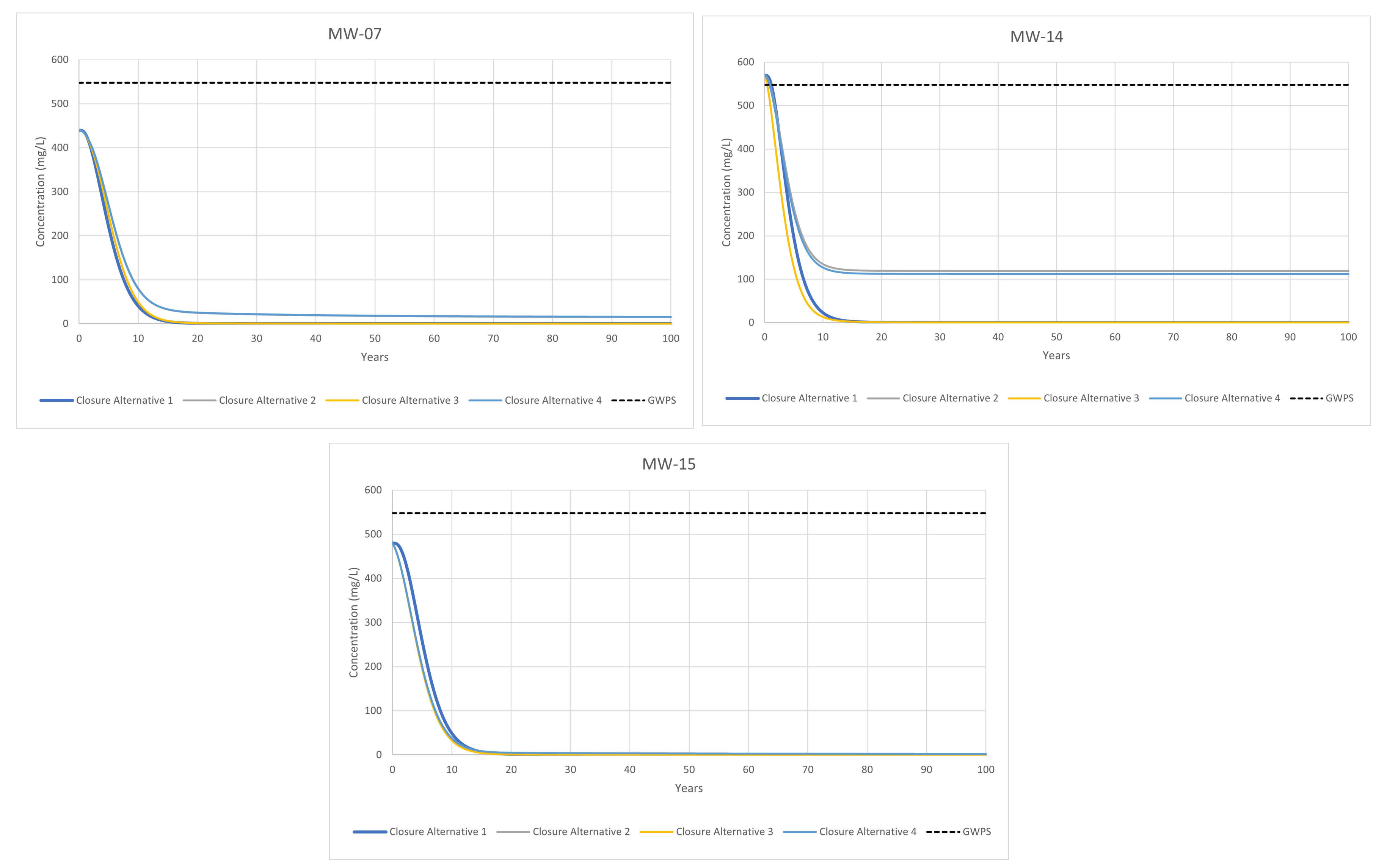
SCALE AT ANSI A	DRAWN DZF	03/20/2023
	CHECKED BAS	03/20/2023
BAS PROJECT No. 21141501	FIGURE: **41**	

CLIENT
MIDWEST
GENERATION

SITE
WILL COUNTY
529 OLD ROMEO RD, ROMEOVILLE, IL

TITLE
MOLYBDENUM CONCENTRATIONS OVER TIME, PONDS 2S/3S DOWNGRADIENT WELLS

Project File: Figure41_MolybdenumConcentrations2S3S.qgz



BAS GROUNDWATER CONSULTING

KPRG

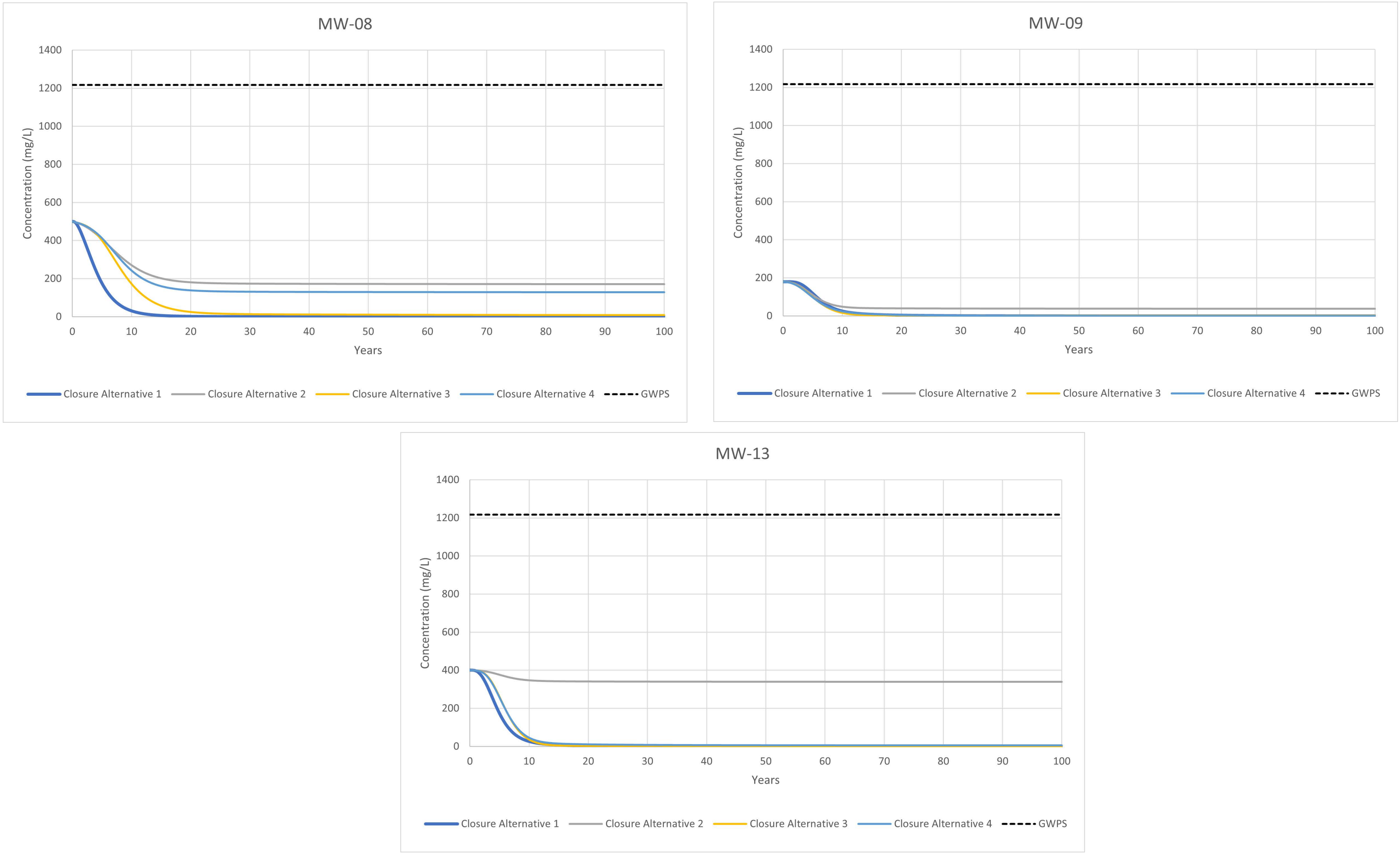
SCALE AT ANSI A	*DRAWN*	*DZF*	03/20/2023
	CHECKED	*BAS*	03/20/2023
BAS PROJECT No. *21141501*		*FIGURE:* **42**	

CLIENT
MIDWEST
GENERATION

SITE
WILL COUNTY
529 OLD ROMEO RD, ROMEOVILLE, IL

TITLE
SULFATE CONCENTRATIONS OVER TIME,
POND 1N DOWNGRADIENT WELLS

Project File: Figure42_SulfateConcentrations1N.qgz



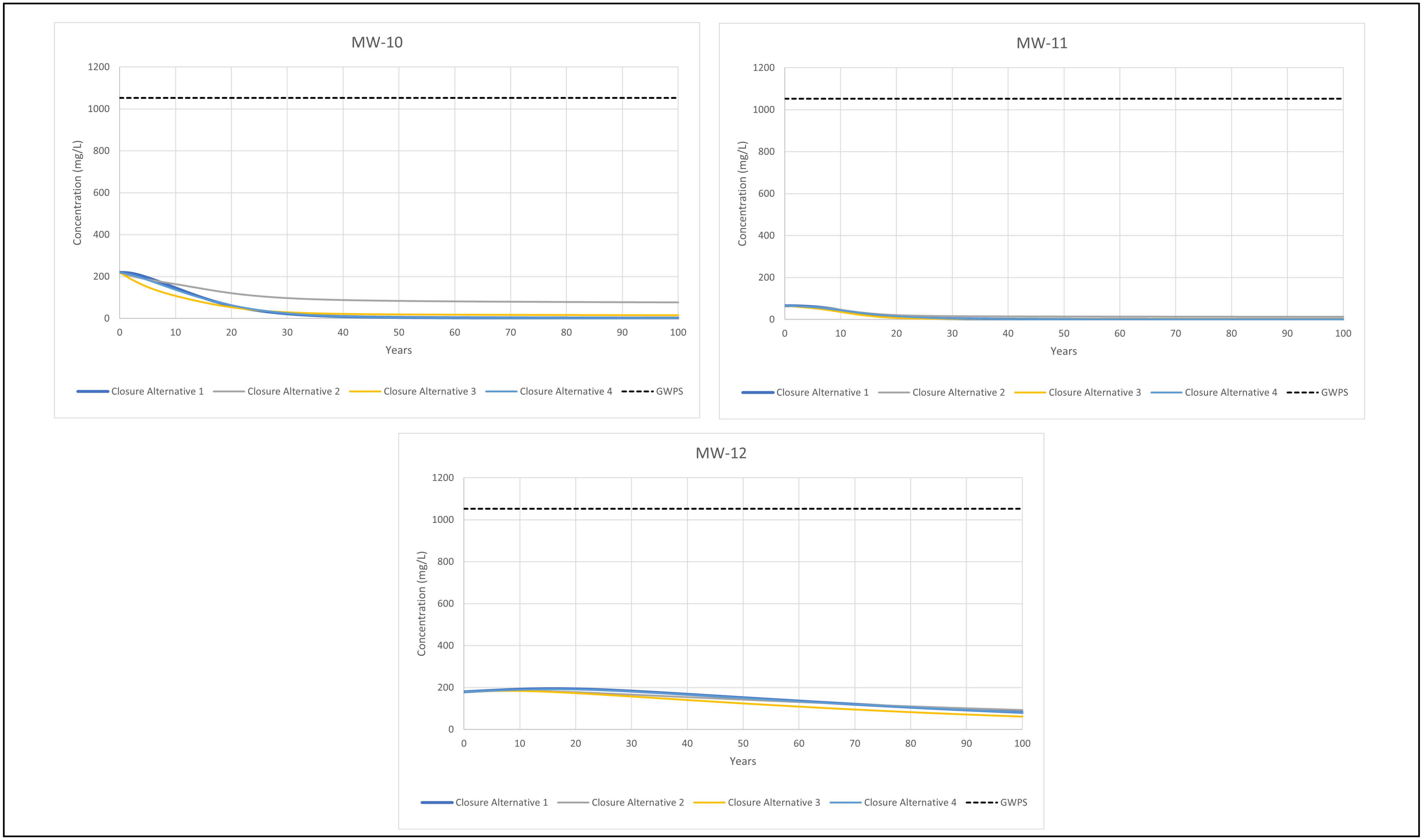
SCALE AT ANSI A	DRAWN DZF	03/20/2023
	CHECKED BAS	03/20/2023
BAS PROJECT No. 21141501	FIGURE: **43**	

CLIENT
MIDWEST
GENERATION

SITE
WILL COUNTY
529 OLD ROMEO RD, ROMEOVILLE, IL

TITLE
SULFATE CONCENTRATIONS OVER TIME, POND 1S DOWNGRADIENT WELLS

Project File: Figure43_SulfateConcentrations1S.qgz



SCALE AT ANSI A	DRAWN	DZF	03/20/2023
	CHECKED	BAS	03/20/2023
BAS PROJECT No. 21141501		FIGURE: **44**	

CLIENT
MIDWEST
GENERATION

SITE
WILL COUNTY
529 OLD ROMEO RD, ROMEOVILLE, IL

TITLE
SULFATE CONCENTRATIONS OVER TIME, PONDS 2S/3S DOWNGRADIENT WELLS

Project File: Figure44_SulfateConcentrations2S3S.qgz

Attachment 7-3 – Ponds 1N, 1S, 2S, and 3S Post-Closure Plans

MWG
Midwest Generation, LLC
Will County Generating Station

Post-Closure Care Plan for Pond 1N & Pond 1S

Revision 1
July 28, 2023
Issue Purpose: Use
Project No.: 12661-153

55 East Monroe Street
Chicago, IL 60603-5780 USA
312-269-2000
www.sargentlundy.com

Sargent & Lundy

TABLE OF CONTENTS

1.0 PURPOSE

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.780(d)

Pond 1N and Pond 1S at Midwest Generation, LLC's (MWG) Will County Generating Station ("Will County" or the "Station") are former ash ponds that were taken out of service in 2010. Both former ash ponds are regulated as inactive coal combustion residual (CCR) surface impoundments under the Illinois Pollution Control Board's "Standards for the Disposal of Coal Combustion Residuals in CCR Surface Impoundments," which are codified in Part 845 to Title 35 of the Illinois Administrative Code (35 Ill. Adm. Code 845, Ref. 1) and are also referred to herein as the "Illinois CCR Rule."

Pursuant to 35 Ill. Adm. Code 845.780(d), this document provides the written post-closure care plan for Ponds 1N and 1S at Will County. MWG intends to close these former ash ponds by leaving the impounded CCR in place and installing final cover systems over the impoundments in accordance with 35 Ill. Adm. Code 845.750. Following completion of all closure activities, MWG will conduct post-closure care for Ponds 1N and 1S in accordance with the requirements of 35 Ill. Adm. Code 845.780. This plan describes the post-closure care activities MWG anticipates performing throughout the post-closure care periods for Ponds 1N and 1S.

2.0 POST-CLOSURE MONITORING & MAINTENANCE ACTIVITIES

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.780(d)(1)(A)

Post-closure monitoring for Ponds 1N and 1S will include (1) maintaining the integrity and effectiveness of the final cover systems, (2) maintaining the groundwater monitoring system, and (3) monitoring the groundwater at the site. Table 1 summarizes the post-closure monitoring activities planned to meet these objectives and the corresponding frequencies at which these activities will be performed (at a minimum).

Table 1 – Post-Closure Monitoring Frequency

Monitoring Activity	Description	Monitoring Frequency	Corrective Action Items
Final Cover Monitoring	Visually inspect final cover for surface erosion.	Weekly, and following each 25-year, 24-hour storm event if the storm event occurs more than 48 hours before the next scheduled weekly inspection.	Replace synthetic turf infill as needed.
	Visually inspect final cover for settlement, subsidence, and vertical cracking.		Repair holes, depressions, *etc*. as needed to prevent standing water and infiltration into covered ash.
	Visually inspect concrete overflow troughs for damage and signs of distress.		Repair concrete as appropriate.
Groundwater Monitoring	Monitor groundwater quality at Ponds 1N and 1S.	Quarterly for constituents and monthly for groundwater elevations, switching to semi-annually after five years of post-closure monitoring if approved by the Illinois EPA.	If necessary, implement corrective action remedies to achieve compliance with groundwater protection standards.

2.1 FINAL COVER SYSTEM MONITORING & MAINTENANCE

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.780(b)(1)

Throughout the post-closure care period, MWG will maintain the integrity and effectiveness of both final cover systems installed over Ponds 1N and 1S by regularly inspecting the caps for evidence of surface erosion, settlement, subsidence, or other events. These inspections will be performed by a qualified person in accordance with 35 Ill. Adm. Code 845.540(a) and will occur at least once a week and after each 25-year, 24-hour storm event if the latter occurs more than 48 hours before the next scheduled weekly inspection. If inspections reveal problems, appropriate corrective measures will be taken to remedy effects of surface erosion, settlement, subsidence, or other events.

In addition to monitoring the final cover systems for Ponds 1N and 1S for issues caused by large storm events and other potential on-site issues, MWG will visually inspect the western concrete overflow troughs for damage and signs of distress (e.g., cracking). If inspections reveal problems, appropriate corrective measures will be implemented.

2.2 GROUNDWATER MONITORING

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.780(b)(3)

MWG will maintain the groundwater monitoring system for Ponds 1N and 1S and will continue to monitor groundwater at the site throughout the post-closure care period in accordance with the requirements of 35 Ill.

Adm. Code Part 845 Subpart F ("Groundwater Monitoring and Corrective Action"). During the first five years of the pond's post-closure care period, groundwater monitoring will be performed quarterly for constituents and monthly for groundwater elevations. After five years of post-closure care, groundwater monitoring may be switched to a semi-annual basis if approved by the Illinois EPA.

3.0 FACILITY CONTACT DURING POST-CLOSURE CARE PERIOD

Illinois CCR Rule Reference: 35 Ill. Adm. 845.780(d)(1)(B)

The name, address, telephone number, and e-mail address of the person to contact about Ponds 1N and 1S during the post-closure care period are presented below:

Name: Phillip Raush
Address: Will County Generating Station
529 East Romeo Road
Romeoville, IL 60441
Telephone Number: (815) 207-5412
E-mail Address: Phillip.Raush@nrg.com

4.0 PROPERTY USE DURING POST-CLOSURE CARE PERIOD

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.780(d)(1)(C)

As of the date of this plan, MWG intends for the sites of Ponds 1N and 1S to remain undisturbed during their post-closure care periods. MWG plans to limit access to the sites only for inspecting the conditions of the final cover systems, making repairs to the final cover systems (as needed), and for accessing the groundwater monitoring wells (as needed).

5.0 AMENDMENTS TO POST-CLOSURE CARE PLAN

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.780(d)(3)

This post-closure care plan will be amended in accordance with 35 Ill. Adm. Code 845.780(d)(3) if a change in the operation of Pond 1N or Pond 1S would substantially affect this plan or if an unanticipated event necessitates a revision to this plan.

6.0 CERTIFICATION

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.780(d)(4)

I certify that:

- This written post-closure care plan for Pond 1N and Pond 1S was prepared by me or under my direct supervision.
- The work was conducted in accordance with the requirements of 35 Ill. Adm. Code 845.780.
- I am a registered professional engineer under the laws of the State of Illinois.

Certified By: Thomas J. Dehlin

Date: July 28, 2023

Seal:

THOMAS J. DEHLIN
062-069314

7.0 REFERENCES

1. Illinois Pollution Control Board. “Standards for Disposal of Coal Combustion Residuals in CCR Surface Impoundments.” 35 Ill. Adm. Code 845. Accessed April 12, 2023.

MWG
Midwest Generation, LLC

Will County Generating Station

Post-Closure Care Plan for South Ash Pond 2 & South Ash Pond 3

Revision 2

July 28, 2023

Issue Purpose: Use

Project No.: 12661-153

55 East Monroe Street
Chicago, IL 60603-5780 USA
312-269-2000
www.sargentlundy.com

Sargent & Lundy

TABLE OF CONTENTS

1.0 PURPOSE & SCOPE

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.780(d)
Federal CCR Rule Reference: 40 CFR 257.104(d)

1.1 PURPOSE

South Ash Pond 2 and South Ash Pond 3 at Midwest Generation, LLC's (MWG) Will County Generating Station ("Will County" or the "Station") are existing coal combustion residual (CCR) surface impoundments that are regulated by the Illinois Pollution Control Board's "Standards for the Disposal of Coal Combustion Residuals in CCR Surface Impoundments." These regulations are codified in Part 845 to Title 35 of the Illinois Administrative Code (35 Ill. Adm. Code 845, Ref. 1) and are also referred to herein as the "Illinois CCR Rule." South Ash Ponds 2 and 3 are also regulated by the U.S. Environmental Protection Agency's (EPA) "Standards for the Disposal of Coal Combustion Residuals in Landfills and Surface Impoundments," 40 CFR Part 257 Subpart D (Ref. 2), also referred to herein as the "Federal CCR Rule."

Pursuant to 35 Ill. Adm. Code 845.780(d) and 40 CFR 257.104(d), this document provides the written post-closure care plan for South Ash Pond 2 and 3 at Will County. MWG intends to close these CCR surface impoundments by leaving the impounded CCR in place and installing final cover systems over the impoundments in accordance with 35 Ill. Adm. Code 845.750 and 40 CFR 257.102(d). Following completion of all closure activities, MWG will conduct post-closure care for South Ash Pond 2 and 3 in accordance with the requirements of 35 Ill. Adm. Code 845.780 and 40 CFR 257.104(b). This plan describes the post-closure care activities MWG anticipates performing throughout the post-closure care periods for South Ash Pond 2 and 3.

1.2 SCOPE

Per the 2016 Water Infrastructure Improvements for the Nation (WIIN) Act, South Ash Ponds 2 and 3 will continue to be subject to both the Illinois and Federal CCR Rules until the U.S. EPA approves the Illinois EPA's CCR permit program. The Illinois EPA has yet to publish a timeline for submitting its proposed CCR permit program to the U.S. EPA for approval, and so this written post-closure care plan has been prepared pursuant to both sets of regulations.

2.0 POST-CLOSURE MONITORING & MAINTENANCE ACTIVITIES

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.780(d)(1)(A)

Federal CCR Rule Reference: 40 CFR 257.104(d)(1)(i)

Post-closure monitoring for South Ash Ponds 2 and 3 will include (1) maintaining the integrity and effectiveness of the final cover system, (2) maintaining the groundwater monitoring system, and (3) monitoring the groundwater at the site. Table 1 summarizes the post-closure monitoring activities planned to meet these objectives and the corresponding frequencies at which these activities will be performed (at a minimum).

Table 1 – Post-Closure Monitoring Frequency

Monitoring Activity	Description	Monitoring Frequency	Corrective Action Items
Final Cover Monitoring	Visually inspect final cover for surface erosion.	Weekly, and following each 25-year, 24-hour storm event if the storm event occurs more than 48 hours before the next scheduled weekly inspection.	Replace synthetic turf infill as needed.
	Visually inspect final cover for settlement, subsidence, and vertical cracking.		Repair holes, depressions, *etc*. as needed to prevent standing water and infiltration into covered ash.
	Visually inspect concrete overflow troughs for damage and signs of distress.		Repair concrete as appropriate.
Groundwater Monitoring	Monitor groundwater quality at South Ash Ponds 2 and 3.	Quarterly for constituents and monthly for groundwater elevations, switching to semi-annually after five years of post-closure monitoring if approved by the Illinois EPA.	If necessary, implement corrective action remedies to achieve compliance with groundwater protection standards.

2.1 FINAL COVER SYSTEM MONITORING & MAINTENANCE

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.780(b)(1)

Federal CCR Rule Reference: 40 CFR 257.104(b)(1)

Throughout the post-closure care period, MWG will maintain the integrity and effectiveness of both final cover systems installed over South Ash Ponds 2 and 3 by regularly inspecting the caps for evidence of surface erosion, settlement, subsidence, or other events. These inspections will be performed by a qualified person in accordance with 35 Ill. Adm. Code 845.540(a) and will occur at least once a week and after each 25-year, 24-hour storm event if the latter occurs more than 48 hours before the next scheduled weekly inspection. If inspections reveal problems, appropriate corrective measures will be taken to remedy effects of surface erosion, settlement, subsidence, or other events.

In addition to monitoring the final cover systems for South Ash Ponds 2 and 3 for issues caused by large storm events and other potential on-site issues, MWG will visually inspect the western concrete overflow troughs for damage and signs of distress (e.g., cracking). If inspections reveal problems, appropriate corrective measures will be implemented.

2.2 GROUNDWATER MONITORING

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.780(b)(3)
Federal CCR Rule Reference: 40 CFR 257.104(b)(3)

MWG will maintain the groundwater monitoring system for South Ash Ponds 2 and 3 and will continue to monitor groundwater at the site throughout the post-closure care period in accordance with the requirements of 35 Ill. Adm. Code Part 845 Subpart F (“Groundwater Monitoring and Corrective Action”) and 40 CFR 257.90 through 40 CFR 257.98. During the first five years of the pond’s post-closure care period, groundwater monitoring will be performed quarterly for constituents and monthly for groundwater elevations. After five years of post-closure care, groundwater monitoring may be switched to a semi-annual basis if approved by the Illinois EPA.

3.0 FACILITY CONTACT DURING POST-CLOSURE CARE PERIOD

Illinois CCR Rule Reference: 35 Ill. Adm. 845.780(d)(1)(B)
Federal CCR Rule Reference: 40 CFR 257.104(d)(1)(ii)

The name, address, telephone number, and e-mail address of the person to contact about South Ash Ponds 2 and 3 during the post-closure care period are presented below:

Name: Phillip Raush
Address: Will County Generating Station
529 East Romeo Road
Romeoville, IL 60441
Telephone Number: (815) 207-5412
E-mail Address: Phillip.Raush@nrg.com

4.0 PROPERTY USE DURING POST-CLOSURE CARE PERIOD

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.780(d)(1)(C)
Federal CCR Rule Reference: 40 CFR 257.104(d)(1)(iii)

As of the date of this plan, MWG intends for the sites of South Ash Ponds 2 and 3 to remain undisturbed during their post-closure care periods. MWG plans to limit access to the sites only for inspecting the conditions of the final cover systems, making repairs to the final cover systems (as needed), and for accessing the groundwater monitoring wells (as needed).

5.0 AMENDMENTS TO POST-CLOSURE CARE PLAN

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.780(d)(3)
Federal CCR Rule Reference: 40 CFR 257.104(d)(3)

This post-closure care plan will be amended in accordance with 35 Ill. Adm. Code 845.780(d)(3) and 40 CFR 257.104(d)(3) if a change in the operation of South Ash Pond 2 or South Ash Pond 3 would substantially affect this plan or if an unanticipated event necessitates a revision to this plan.

6.0 CERTIFICATION

Illinois CCR Rule Reference: 35 Ill. Adm. Code 845.780(d)(4)
Federal CCR Rule Reference: 40 CFR 257.102(d)(4)

I certify that:

- This written post-closure care plan for South Ash Pond 2 and South Ash Pond 3 was prepared by me or under my direct supervision.
- The work was conducted in accordance with the requirements of 35 Ill. Adm. Code 845.780 and with the requirements of 40 CFR 257.104.
- I am a registered professional engineer under the laws of the State of Illinois.

Certified By: Thomas J. Dehlin

Date: July 28, 2023

Seal:

THOMAS J. DEHLIN
062-069314

7.0 REFERENCES

1. Illinois Pollution Control Board. “Standards for Disposal of Coal Combustion Residuals in CCR Surface Impoundments.” 35 Ill. Adm. Code 845. Accessed April 12, 2023.
2. U.S. Environmental Protection Agency. “Standards for Disposal of Coal Combustion Residuals in Landfills and Surface Impoundments.” 40 CFR Part 257 Subpart D. https://www.ecfr.gov/current/title-40/chapter-I/subchapter-I/part-257/subpart-D. Accessed April 12, 2023.

ATTACHMENT 8
GROUNDWATER MODELING REPORT

REPORT

NUMERICAL GROUNDWATER FLOW MODEL

Groundwater Flow Modeling in Support of CCR Compliance and Permitting

Midwest Generation, LLC
Will County Generating Station
Romeoville, Illinois

Submitted to:

KPRG and Associates, Inc.
14665 W. Lisbon Road, Suite 1A
Brookfield, WI 53005

and:

Midwest Generation, LLC
Will County Generating Station
529 East Romeo Road
Romeoville, IL 60446

Prepared by:

BAS Groundwater Consulting Inc.
3649 Evergreen Parkway Ste 1510
Evergreen, Colorado 80437
+1 720 334-8249

May 8, 2023

NUMERICAL GROUNDWATER FLOW MODEL

Groundwater Flow Modeling in Support of CCR Compliance and Permitting

Midwest Generation, LLC
Will County Generating Station
Romeoville, Illinois

BAS Project Number 21141501

Submitted to:

KPRG and Associates, Inc.
14665 W. Lisbon Road, Suite 1A
Brookfield, WI 53005

and:

Midwest Generation, LLC
529 East Romeo Road
Romeoville, IL 60446

Prepared by:

BAS Groundwater Consulting Inc.
3649 Evergreen Parkway Ste 1510
Evergreen, Colorado 80437
+1 720 334-8249

May 8, 2023

Author:
Betsy Semmens, RG
President/BAS Groundwater Consulting Inc.

Contributor:
Dacey Zelman-Fahm
Senior GIS Analyst/*BAS Groundwater Consulting Inc.*
Rochelle Destrampe, RG
Senior Hydrogeologist/*BAS Groundwater Consulting Inc.*

DISTRIBUTION LIST

Midwest Generation, LLC

KPRG and Associates, Inc.

Illinois Environmental Protection Agency (IEPA)

Executive Summary

This report documents the results of a numerical groundwater modeling analysis of groundwater flow in the vicinity of the four inactive ash ponds at the Midwest Generation, LLC (Midwest Generation) Will County Generating Station (Will Co Station). The purpose of the numerical groundwater modeling was to create a tool capable of evaluating groundwater flow paths in the vicinity of the ash ponds and to provide a platform upon which proposed engineering scenarios for closure can be overlain and evaluated for their short and long-term effectiveness relative to improvements of groundwater quality. The results of the modeling are intended for input into the engineering considerations and evaluations of various closure alternatives being evaluated for Will Co Station. This modeling is a requirement under Illinois Administrative Code Title 35 Part 845.220(d)(3).

The model has a uniform grid spacing of 50 ft and has four layers. The groundwater flow model was run in the software MODFLOW-NWT and the transport model was run with the software MT3D-USGS. The model represents the regional flow direction to the Des Plaines River to the west and the Chicago Sanitary and Ship Canal to the east, with no-flow boundaries on the north and south sides of the model.

The model was calibrated to water levels measured in monitoring wells upgradient and downgradient of the four ash ponds (Ash Ponds 1N, 1S, 2S, and 3S). The model achieved a good calibration, with a scaled root mean squared error of less than 10 percent. The model was the most sensitive to the modeled values of hydraulic conductivity, vertical anisotropy, and the regional recharge rate.

To meet the modeling requirements of Part 845.220(d)(3), a hypothetical initial situation was created in which a constant surrogate mass (relative concentration of “1”) was modeled at the four ash ponds and allowed to discharge freely to groundwater. The resulting hypothetical distribution of concentrations served as the initial concentrations to four predictive scenarios of closure alternatives. In summary, the predictive modeling results indicate that all four evaluated alternatives for closure of the ash ponds resulted in improvement to groundwater quality. For any parameter detections above proposed GWPSs, all four closure alternatives were found to reduce impacts to below the respective proposed GWPS. All alternatives also have a good overall long-term performance.

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TABLES

FIGURES

Table of Abbreviations

Abbreviation	Definition
ADAMP	Adaptive damping
af/yr	Acre-feet per year
amsl	Above mean sea level
bgs	Below ground surface
CCR	Coal Combustion Residuals
State CCR Rule	Title 35, Part 845: Standards for the Disposal of Coal Combustion Residuals in Surface Impoundments, Section 845.220(d)(3)
CSSC	Chicago Sanitary and Ship Canal
cfd	Cubic feet per day
cm/s	Centimeters per second
ft	Feet
ft/ft	Feet per foot
ft/d	Feet per Day
ft^2	Feet squared
ft^2/d	Feet or foot squared per day
GHB	General Head Boundary
GIS	Geographic information systems
gpm	Gallons per minute
GWPS	Groundwater protection standards
HCLOSEXMD	Head change closure criterion
HFB	Horizontal flow barrier
in/yr	Inches per year
ISGS	Illinois State Geological Survey
ILWATER	Illinois Water Well Database
K	Hydraulic conductivity
Kh	Horizontal hydraulic conductivity
Kv	Vertical hydraulic conductivity
LINMETH	Linear solution method

Abbreviation	Definition
MAP	Mean annual precipitation
Midwest Generation	Midwest Generation LLC
mg/l	Milligrams per liter
PCGn	Preconditioned conjugate gradient
phi	Sum of squared residuals
RMS	Root Mean Square
Will Co Station	Will County Generating Station
%	Percent

1.0 INTRODUCTION

This report documents the results of a numerical groundwater modeling analysis of groundwater flow in the vicinity of the on-site Ash Ponds 1 North (1N), 1 South (1S), 2 South (2S) and 3 South (3S) at the Midwest Generation, LLC (Midwest Generation) Will County Generating Station (Will Co Station). The numerical groundwater flow and transport modeling was conducted as required under the Ill. Adm. Code Title 35, Part 845: Standards for the Disposal of Coal Combustion Residuals (CCR) in Surface Impoundments (State CCR Rule) Section 845.220(d)(3).

2.0 BACKGROUND

Will County Station is an inactive coal power generating station located on the eastern bank of the Des Plaines River in Section 2, Township 36 North, Range 10 East, in the City of Romeoville, Will County, Illinois. As noted above, there are four ash ponds at the site (1N, 1S, 2S and 3S) all of which are inactive at this time. The locations of the facility and ash ponds are shown on Figure 1. Will County Station is bordered by Romeo Road and vacant land to the north, the Des Plaines River to the west, a rock quarry to the south, and the Chicago Sanitary and Ship Canal (CSSC) to the east (Figure 2). There are 15 monitoring wells located on site, The groundwater monitoring program for pond 1N consists of five wells with wells MW-01 and MW-02 being upgradient monitoring points and wells MW-07, MW-14 and MW-15 being downgradient monitoring points. The groundwater monitoring program for pond 1S also consists of five wells with MW-03 and MW-04 being the upgradient monitoring points and wells MW-08, MW-09 and MW-13 being downgradient monitoring points. The monitoring well network for the combined Ponds 2S and 3S consists of six monitoring points with wells MW-05 and MW-06 being upgradient monitoring wells and wells MW-09, MW-10, MW-11 and MW-12 being downgradient monitoring points. It is noted that monitoring well MW-09 is a common downgradient well for the Pond 1S network and the combined ponds 2S and 3S network. The locations of site monitor wells are shown on Figure 2.

The purpose of the numerical groundwater modeling was to create a tool capable of evaluating groundwater flow paths near the ash ponds and to estimate changes to monitored constituent concentrations at the Will County site from pond closure alternatives being evaluated.

3.0 REPORT ORGANIZATION

The remainder of this report is organized as follows:

- Section 4.0: Conceptual Model – This section provides information that was used to refine the conceptual model of groundwater flow at Will County Station. The conceptual model formed the basis for construction and calibration of the numerical model.
- Section 5.0: Numerical Groundwater Flow Model – This section provides a description of the numerical model construction, calibration, and sensitivity analysis. The calibrated groundwater flow model was used as the basis to conduct predictive analyses of closure construction activities.

- Section 6.0: Predictive Model Simulations – This section provides results of predictive analyses that were used to evaluate changes to the water table, groundwater flow paths, and contaminant concentrations beneath and adjacent to the ash ponds under multiple closure alternatives.
- Section 7.0: Conclusions – This section provides a summary of the modeling and predictive analysis.
- Section 8.0: References – This section provides a list of references used in the analysis documented in this report.

Figures and tables follow the main text of the report.

4.0 CONCEPTUAL MODEL

Site data were compiled as part of this modeling study and used to update the conceptual model of groundwater flow at Will Co Station. The numerical model was constructed to represent the updated conceptual model.

Components of the conceptual model of groundwater flow include:

- climate
- lithology and geologic framework
- aquifer properties
- nature of groundwater flow
- water budget

Each of these components of the conceptual model is presented below.

4.1 Climate

Will Co Station is located within the humid continental climate zone with warm to hot and humid summers and cold and snowy winters. The Romeoville Forecast Office weather station is located relatively near Will Co Station (see Figure 3) and provides data to evaluate long-term trends in precipitation. Precipitation data from this station was averaged for monthly and annual averages and are provided in Table 1. Long-term average monthly precipitation has ranged from just over 2 inches in January and February to over 4 inches in late Spring and Summer (April through August). The long-term mean annual precipitation (MAP) from these data is 42 inches.

4.2 Geology

The geology at Will Co Station was summarized by KPRG in the Application for Initial Operating Permit for Ponds 2S and 3S (KPRG, 2021) as well as in the Application for initial Operating Permit for Ponds 1N and 1S (KPRG 2022) as approximately 1 to greater than 20 feet (ft) of unconsolidated deposits underlain by Silurian Dolomite to approximately 140 ft below ground surface (bgs). The Silurian dolomite is underlain by the Maquoketa Group which includes the Scales Shale, which is considered to be a regional aquitard separating the shallow groundwater within the unconsolidated deposits and Silurian Dolomite from the deeper, underlying Cambro-Ordovician aquifers. The Applications (KPRG, 2021 and 2022) summarized the general site lithology from site boreholes as:

- Fill (approx. 5 ft to 10 ft thick) – Consisting of a thin layer of sand and gravel roadway followed by brown and black silty clay and silty sand mixed with gravel and crushed dolomite. The fill may include coal, black cinders, and slag.
- Silty Sand, Silt and Clay (approx. 1 ft – 16 ft thick) – Consisting of gravelly tan to brown silty sand fining downward to gray/greenish mottled silty clays and clay.
- Bedrock – Dolomite bedrock. Top of weathered bedrock is generally encountered between 9 ft and greater than 20 ft below ground surface with depth increasing towards the southwest. It is noted that at monitoring well location MW-12, top of bedrock was not encountered at the terminus of the boring at 20 ft below ground surface.

Surficial geology was obtained from the Romeoville Quadrangle Map (Caron, 2017) and is shown on Figure 4. Borehole logs for the site wells were compiled along with logs for nearby wells from the Illinois State Geological Survey's (ISGS) Water and Related Wells Database (ILWATER) and are presented in Table 2 and Figure 5. Lithology in the borehole logs is displayed in three dimensions in Figure 6 and includes the groups:

- Loam
- Overburden
- Topsoil
- Fill
- Clay, and Sandy Clay
- Clay, Sand, and Gravel
- Clay
- Silt and Clay
- Sand
- Sand and Gravel
- Dolomite
- Carbonate and Shale
- Carbonate

- Shale

Near the site the unconsolidated lithology is dominated by silty sand, silt, and clay. The lithologic intervals provided guidance on initial model calibration through the definition of zones of hydraulic conductivity that were later modified as discussed further in Section 5.2.1.

4.3 Aquifer Properties

Aquifer properties of hydraulic conductivity (K) and storage are important controls on groundwater movement and behavior and are necessary parameters to define in a numerical model. Hydraulic conductivity values were initially estimated for monitor wells MW-01, -04, -06, -07, and -09, screened in the carbonate unit, from slug tests (Patrick Engineering 2011). The geometric mean of the test data for these wells was approximately 30 feet per day (ft/d) for each well, as calculated by (Patrick Engineering, 2011). The slug test data were reviewed as part of this current modeling study and the data were reanalyzed using corrected input values for the well casing and borehole dimensions, effective porosity of the sand filter pack material, and minor line fitting refinement. The revised hydraulic conductivity estimated values are summarized in Table 3 for comparison. The revised geometric mean of the test data for these wells decreased to approximately 20 ft/d for each well.

4.4 Nature of Groundwater Flow

Groundwater occurs under unconfined conditions with depth to water ranging from approximately 8 ft at monitor well MW-11 to approximately 13 ft at monitor wells MW-04 and -08 (KPRG, 2022). Saturated conditions are generally encountered near or at the top of weathered carbonate bedrock. Four quarterly groundwater flow maps based on monitoring well water levels were presented in the Applications (Figures 9-7 through 9-10 of KPRG, 2021 and 2022). The maps show groundwater flow direction is generally to the west beneath the ash ponds toward the Des Plaines River which is the main hydrogeologic discharge boundary in the vicinity of the Ponds. Patrick Engineering (2011) discussed that groundwater flow in the greater plant area should be largely controlled by the Des Plaines River to the west of the site and the CSSC to the east of the site with groundwater likely flowing toward both features during most periods of the year. Based on water levels measured in the site monitor wells, the noted groundwater divide that separates flow directions to the west (Des Plaines River) and the east (CSSC) is east of the ash ponds, and therefore groundwater beneath the ash ponds flows to the west towards the Des Plaines River.

Groundwater level measurements from the site wells from June 2011 through September 2022 were used for this modelling effort. A summary of these data is provided in Table 4 including minimum and maximum measured water level elevations and the average water level elevation from the 1st and 3rd quartiles to eliminate statistical outliers. These average water levels, for monitor wells MW-01 through MW-12 were used as the water level calibration targets. It should be noted that site monitor wells MW-13, -14, and -15 were installed in 2021 and therefore only have water level data since second quarter 2021. The average of these more recent water levels was also used as calibration targets for the model calibration. No recent, shallow water levels were found in the

Illinois Domestic Wells Database or the Illinois Water and Related Wells Database (2021) to supplement these site data for the model calibration.

4.5 Impacted Groundwater

As noted above, the CCR groundwater monitoring network for Ash Ponds 2S and 3S has six wells: MW-05, MW-06, and MW-09 through -12. Wells MW-05 and MW-06 are upgradient monitoring wells and wells MW-09 through -12 are downgradient monitoring wells. CCR sampling under the Federal Rule was initiated in 2015 for the identified Appendix III and Appendix IV parameters and assessment monitoring under that program is ongoing for Appendix III and Appendix IV parameters. Also, starting in second quarter 2021, sampling under the new State CCR Rule was initiated quarterly for all Federal CCR Rule Appendix III/IV parameters plus turbidity since the State Rule does not distinguish between detection and assessment monitoring parameter lists. Ash Ponds 1N and 1S were not part of the Federal Rule CCR program, however, they are covered under the State CCR Rule. Therefore, eight rounds of groundwater monitoring were initiated in the second quarter 2021 for all parameters specified in Section 845.600(a)(1) plus turbidity to provide the data needed for establishing the required background concentrations. Subsequent to those eight rounds of sampling, quarterly sampling for all parameters has been ongoing.

As discussed in the Illinois CCR Compliance Ash Ponds 1 North and 1 South Annual Groundwater Monitoring and Corrective Action Report, and in the Illinois CCR Compliance Ash Ponds 2 South and 3 South Annual Groundwater Monitoring and Corrective Action Report, both dated January 30, 2023 the following parameters were detected at concentrations above proposed Groundwater Protection Standards during the 4th quarter 2022 sampling in downgradient monitoring wells:

- Arsenic
- Calcium
- Chloride
- Molybdenum
- Sulfate

These parameters will be the focus of predictive modeling comparisons for the various alternatives discussed in Section 6.0 below. It is noted that boron was also added to the above list of parameters to be evaluated in Section 6.0 since this is a main indicator of potential CCR impacts.

4.6 Water Budget

A conceptual water budget was developed for Will Co Station to provide context of the results of the calibrated model water budget (ASTM D5447-17, 2017). The identified and estimated components of the conceptual water budget included:

- recharge to groundwater
- discharge of groundwater to the CSSC
- discharge of groundwater to the Des Plaines River

The conceptualized estimate for each of these components of the water budget is discussed below. The conceptual water budget was used as an initial definition of the water budget in the numerical model, and components were adjusted during model calibration.

4.6.1 Recharge to Groundwater

Recharge from the infiltration of precipitation to the water table has been estimated in a regional, general context for northeastern Illinois:

- A groundwater/surface water model for the Upper Fox River Basin in Southeastern Wisconsin estimated recharge of approximately 4 to 4.4 inches/year (in/yr) (Feinstein, Fienen, Kennedy, Buchwald, & Greenwood, 2012).
- The Illinois State Water Survey (ISWS) estimated shallow groundwater recharge using a geographic information system (GIS) approach coupled with pattern recognition (Interagency Coordinating Committee on Groundwater, 2010). A generalized map of potential recharge at Illinois power plants shows the Will Co Station on the edge of the border between areas with “moderately low to low” to “very high” recharge potential.

Recharge from precipitation was initially assumed in the groundwater model at 1.3 in/yr, which equates to approximately 3 percent of MAP. This rate over the model domain minus the river (Section 5.1) equates to approximately 18 acre-feet per year (af/yr) (2,200 cubic feet per day (cfd)).

4.6.2 Discharge to Des Plaines River

The boundaries to the groundwater model are discussed below in Section 5.1.3. Groundwater flow west to the Des Plaines River was estimated using Darcy’s Law

$$Q = KA\frac{dh}{dl}$$

where Q is the Darcy Flux, K is the hydraulic conductivity (ft/d), A is the cross-sectional area (ft), and dh/dl is the hydraulic gradient (feet per foot (ft/ft)). Using the length of the western model boundary (4,900 ft), an assumed thickness of weathered carbonate bedrock of up to 10 ft, an assumed hydraulic conductivity of 20 ft/d, and a hydraulic gradient of 0.0049 ft/ft estimated from the water level contours shown on the quarterly groundwater flow maps referenced in Section 4.4 above, a rough estimate of groundwater flow from the east in the weathered carbonate bedrock was calculated as 40 af/yr (4,800 cfd). It is reasonably assumed that groundwater flow through the weathered carbonate bedrock is sufficiently greater than flow through the underlying more competent carbonate bedrock. Given the close proximity to the Des Plaines River as the groundwater discharge boundary in the vicinity of the ponds, the conceptual model water budget does not extend or consider flow in the deeper carbonate bedrock.

4.6.3 Discharge to CSSC

Groundwater flow east to the CSSC was likewise estimated with Darcy's law. This feature was included in the conceptual model because it is a discharge location for groundwater beneath the larger plant area further east of the ponds and is included in the numerical modeling area. As previously stated, groundwater beneath the ash ponds flows to the west to the Des Plaines River and is not expected to interact with the CSSC. The same assumptions were made for the value of hydraulic conductivity and hydraulic gradient as the estimate of discharge to the Des Plaines River (Section 4.5.2) and using the length of the canal within the model domain (4,038 ft), the resulting Darcy flux for groundwater discharge to the CSSC, upgradient of the ash ponds, was estimated as 33 af/yr (3,958 cfd).

This discussion of the conceptual water budget is an order-of-magnitude, first approximation to estimate the components of the water budget that will be represented in the numerical model. The conceptual water budget does not completely balance (i.e., there is greater outflow than inflow), however, the conceptual water budget is only used in a general sense to provide initial estimates for defined boundary conditions and to provide an "order-of-magnitude" comparison to the calibrated model water budget.

5.0 NUMERICAL GROUNDWATER FLOW MODEL

A numerical groundwater flow model was constructed for Will Co Station. This section describes the construction and calibration of the numerical model.

5.1 Model Construction

The numerical model was created to cover the area of the ash ponds at Will Co Station and Midwest Generation Will Co Generating Station property (Figure 8). The model domain extends east from Midwest Generation property to the CSSC, north and south from Midwest Generation property approximately 100 ft to East Romeo Road on the north and just south of Material Road on the south, and west to the Des Plaines River. The selection of lateral boundaries to the model is further described below. The overall, active model area is approximately 0.4 square miles.

5.1.1 Software Selection

The groundwater flow system was simulated with MODFLOW-NWT (Niswonger, 2011), an advanced version of the widely used MODFLOW software. Groundwater Vistas (Version 8.0) (Environmental Simulations Inc. (ESI), 2020), a graphical user interface, was used to parameterize the model input, write MODFLOW files, and visualize results. MODFLOW-NWT was considered over MODFLOW-2000, MODFLOW-2005, or MODFLOW-USG because it has enhanced solvers that employ upstream weighting for non-linear problems, it is a relatively recent, widely used, and non-proprietary release of MODFLOW. It was coupled with the widely-used and non-proprietary transport model MT3DMS (Zheng, 2012), which was used for the transport simulations.

5.1.2 Model Grid and Layering

The model has a uniform grid spacing of 50 ft, has 85 rows and 104 columns (see Figure 9) and four layers yielding a total of 15,940 active cells. The MODFLOW-NWT model was constructed with length and time units of feet and days, respectively. The coordinate system State Plane Illinois East, NAD 83, FIPS 1201 was used for all coordinates and for GIS data management. The model grid has an origin at coordinates 1,056,125, 1,807,439, rotated three degrees to the northwest.

Lithology data was compiled from site well logs and ISGS drill logs and organized into geological units as described in Section 4.2. Contacts were used to create surfaces of the top of the carbonate unit and of the top of the Maquoketa Shale using Seequent Leapfrog™ software (Seequent Limited, 2021), as well as to visualize the borehole lithology. Model layers one and two represent the unconsolidated materials, and model layers three and four represent the carbonate unit. The top of model layer 3 was defined from the created carbonate surface and the bottom of the model was defined from the created surface of the Maquoketa Shale.

The top of the model was defined with surface topography from the U.S. Geological Survey (U.S. Geological Survey, 2021). The volume of unconsolidated material above the carbonate unit was divided into two model layers to simulate groundwater flow through the unconsolidated sediments. Near the ash ponds model layers one and two, together, range in thickness from 2 to 20 ft, consistent with site borehole lithology. Model layer 3 represents weathered carbonate bedrock and was defined as 10 ft thick, as deemed appropriate from site well logs. Representative sections through the model domain are provided in Figure 10 to show the layering in an east-west model row (row 50) and a north-south model column (column 22) through the site.

5.1.3 Model Boundaries

The outside edges of the model domain must be defined with model boundaries to describe how groundwater inside the model domain interacts with groundwater outside the model domain. Additionally, boundaries can be defined interior to the model domain to represent sources and sinks of groundwater such as pumping wells or infiltration through a pond. Exterior boundaries of the numerical model are shown on Figure 8 and include:

- River boundary along the western edge of the model domain, aligned with the Des Plaines River.

- No-flow boundaries along the north and south edges of the model.
- General head boundaries (GHB) along the CSSC

The river boundary along the model's western edge is defined with a stage set to 582 ft at the north end to 577 ft at the south end, consistent with surface topography. The river was defined in model layers 1 through 3. The river was assumed to be 10 ft deep consistent with nearby USGS gage data, and the conductance was set from the model cell dimensions and an assumed hydraulic conductivity of 50 ft/d and a thickness of 1 foot, to represent relative ease of exchanging water between the river and groundwater.

GHB were defined along the CSSC. The GHB was defined in model layer 1 at elevations equal to land surface topography in each model cell. Elevations of the GHB range from 576 ft to 591 ft. Conductance was set from the dimensions of the model cells and assumed hydraulic conductivity of 50 ft/d and thickness of 1 foot to represent relative ease of exchanging water between the CSSC and groundwater.

The northern and southern model boundaries were defined with no flow boundaries to represent streamlines (groundwater flow directions) as expected from the conceptualized direction of groundwater flow.

5.1.4 Model Stresses

In addition to the exterior model boundaries described in Section 5.1.3, MODFLOW boundaries and properties were used in the interior of the model domain to simulate stresses (inflows and outflows) on the groundwater system as follows:

- GHBs were defined in model layer 1 in the area of retention ponds south of the Ash Pond 3S and the small pond north of Ash Pond 1S to represent potential recharge to groundwater. The GHB was defined at an elevation of 583 ft for the southern retention ponds and 590 ft for the northern pond, consistent with topographic data, and an assumed conductance of 1.5 square foot per day (ft^2/d), determined during model calibration.
- GHBs were defined in the footprints of Ash Ponds 1N and 1S to represent potential infiltration to groundwater. Ponds 1N and 1S have been regraded to a drainage system that maintains less than one-foot of water within the ponds and include a Poz-o-pac liner with an estimated permeability of $1x10^{-5}$ centimeters per second (cm/s). The GHB for these ponds was set one foot above the pond bottom elevation of 582.5 ft, and an assumed conductance of 10 ft^2/d, found during model calibration.
- Recharge from precipitation was defined throughout the model domain using MODFLOW's recharge package. Recharge was simulated at approximately 1.5 in/yr (3.5E-04 ft/d) or approximately 4 percent MAP. This is slightly higher than the initial recharge rate assumed in the conceptual water budget of 3 percent MAP (Section 4.5.1) and was increased slightly as part of model calibration. No recharge from precipitation was assigned below the CSSC or ponds that are covered by the GHB, and beneath the Des Plaines River that is covered by the river boundaries.

- Ash Ponds 2S and 3S were simulated with recharge as with the rest of the model domain. Ash Ponds 2S and 3S are lined but the relatively low recharge rate (3.5E-04 ft/d) simulated in the base model provides a relatively small amount of seepage through these ponds and allows for comparison with closure alternatives that cap the ponds.

5.1.5 Numerical Parameters

The Preconditioned Conjugate Gradient (PCGn) package was used with MODFLOW-NWT to solve the system of equations within the model domain. The type of solver was tested in early model runs and the PCGn solver provided a stable solution in a fast computational time compared to other solvers available with MODFLOW. The solver was used with adaptive damping (ADAMP) and the XMD linear solution method (LINMETH), again to provide a stable and computationally quick solution.

Optimal settings for the PCGn with XMD were found during model calibration. Key numerical parameters were a head change closure criterion (HCLOSEXMD) of 1E-04 ft for inner iterations and 1E-05 ft for outer iterations, 2,000 maximum outer iterations and 2,000 maximum inner iterations.

5.2 Model Calibration

The following sections describe the approach taken to calibrate the model and the results of the model calibration.

5.2.1 Approach

The groundwater flow model was first calibrated through a trial-and-error approach by adjusting hydraulic conductivity and recharge rates until the model reasonably matched field measurements in site wells. Model calibration then continued with parameter estimation techniques in PEST software (Doherty, 2010), used with pilot points within Groundwater Vistas.

The flow model calibration relied on the measured water level data provided by KPRG for the site wells MW-01 through MW-15. The period of measured water levels from site wells MW-01 through MW-12 since 2011, and MW-13 through MW-15 since 2021 were averaged, having removed outliers determined from the interquartile range, and used as model calibration targets (Table 4). The data from the site wells were considered reliable and were given a target weight of 1.

In addition to calibrating to measured water levels in the wells, qualitative considerations of model calibration included:

- General groundwater flow directions, and patterns in the hydraulic gradient including western flow to the Des Plains River from beneath the ash ponds and eastern flow toward the CSSC east of the ash ponds, a less steep hydraulic gradient across Ash Pond 1S, and south/southwest flow directions across Ash Pond 3S,

- General consistency in the modeled hydraulic conductivity and the field-measured hydraulic conductivity,
- General consistency in the modeled water budget with the conceptual water budget,
- Saturated conditions near the weathered carbonate bedrock surface near the site, and
- Limiting or eliminating flooding above the surface of the model.

The measure of model calibration, other than the qualitative considerations, was to minimize the calibration residual, measured as the difference between measured and modeled groundwater elevations in wells. A negative residual indicates that the modeled groundwater elevation is higher than the measured elevation, and a positive residual indicates that the modeled groundwater elevation is lower. The statistical measures of average residual, sum of squared residuals, and root mean square (RMS) error were used to objectively evaluate the calibration.

The RMS error was calculated as:

$$\mathrm{RMS} = \left[\frac{1}{\mathrm{n}}\sum_{\mathrm{i}=1}^{\mathrm{n}}(\mathrm{h_o} - \mathrm{h_s})^2\right]^{0.5}$$

where $h_o – h_s$ is the target residual and n is the number of observed groundwater elevation values. The RMS error is typically scaled against the range in observed groundwater elevations in the model area. A scaled RMS error of less than 10% is the standard calibration criteria that is generally considered acceptable throughout the industry (Anderson, 2015).

Initially, the lithologic intervals in borehole locations were intersected with the model grid and zones of hydraulic conductivity (“K zones”) and were drawn around these lithologic groups (i.e., grouped together areas of silty sand, areas of sand and gravel, etc). Hydraulic conductivity was defined for these K zones based on literature values and professional judgement for initial model calibration. After the basic model calibration was completed by varying the values of hydraulic conductivity and recharge, the model calibration was refined using pilot points and PEST software. The manual calibration suggested relatively low values of hydraulic conductivity in the unconsolidated sediments, lower than the data for hydraulic conductivity determined for site wells in the weathered carbonate bedrock (Table 3). Pilot points were defined throughout model layers 2 and 3, the layers that contain the site wells for calibration, to estimate the horizontal and vertical hydraulic conductivity values. The initial value of horizontal hydraulic conductivity in the unconsolidated sediments (layers 1 and 2) was 1 ft/d with a range between 0.1 and 30 ft/d, and in the weathered bedrock (layer 3) was 20 ft/d, consistent with the revised estimates of hydraulic conductivity (Table 3) with a range between 1 and 40 ft/d. This range was deemed reasonable to account for the accuracy of field-measured hydraulic conductivity.

5.2.2 Model Calibration Results

The calibrated distribution of horizontal hydraulic conductivity in the model is shown for each model layer on Figures 11a and 11b. The calibrated model calculated groundwater level contours are shown on Figure 12. The spatial distribution of the calibration residuals is shown on Figure 13 and a scatter plot of the residuals are shown on Figure 14. The calibrated model water budget is provided in Table 5, the model calibration residuals are provided in Table 6, and the calibrated model statistics are provided in Table 7. Recharge from precipitation was simulated at approximately 1.5 in/yr (3.5E-04 ft/d), consistent with the conceptual model and equal to approximately 3.7 percent of MAP (Section 4.5.1)

5.2.2.1 Calibrated Hydraulic Conductivity

The model calibrated distribution of horizontal hydraulic conductivity ranges from approximately 0.1 to 25 ft/d in the unconsolidated sediments (model layers 1 and 2), and from approximately 0.8 to 40 ft/d in the weathered carbonate bedrock (model layer 3). The deeper carbonate bedrock (model layer 4) was assumed equal to 0.15 ft/d. Use of PEST software for the model calibration resulted in a kriged distribution of hydraulic conductivity rather than zones of hydraulic conductivity. A kriged surface is appropriate for heterogeneous unconsolidated sediments and for the heterogeneous weathered carbonates. PEST was used to estimate horizontal and vertical hydraulic conductivity in model layers 2 and 3. The vertical hydraulic conductivity was allowed to be up to 1,000 times lower than the horizontal hydraulic conductivity in the unconsolidated sediments (model layers 1 and 2) and was allowed to be up to 10 times lower than the horizontal hydraulic conductivity in the weathered carbonate bedrock (model layer 3). The deeper carbonate bedrock (model layer 4) was assumed to be vertically isotropic.

The resulting distribution of horizontal hydraulic conductivity in the unconsolidated sediments (model layers 1 and 2) has the highest values (approximately 17 to 25 ft/d) east of the ash ponds near monitor well MW-02, near MW-10, and along the southern part of the model domain. The lowest values (approximately 0.1 to 0.2 ft/d) are found near Pond 2S and Pond 3S, and along the eastern perimeter of the site (Figure 11a). The resulting distribution of horizontal hydraulic conductivity in the weathered carbonate bedrock (model layer 3) has the highest values (approximately 30 to 40 ft/d) beneath Pond 1S, and south and east of the ash ponds, and the lowest values (approximately 1 ft/d) east of the retention pond, northeast of Pond 1N, and along the eastern perimeter of the site (Figure 11b).

The resulting vertical hydraulic conductivity values (Kv) in the unconsolidated sediments (model layers 1 and 2) range from equal to horizontal to three orders of magnitude lower than the horizontal values (Kh), representing a vertical anisotropy ratio that ranges from 1:1 to 1:1000 Kh:Kv, which is appropriate for layered clays, silt, and sand and common in modeling applications (Anderson, 2015). The calibrated vertical anisotropy ratio in the unconsolidated sediments is less than 10 throughout much of the model domain and is highest (lowest Kv values) near Ponds 1N and 1S, and south of Ash Pond 3S beneath the retention ponds (Figure 11a). The calibrated vertical anisotropy ratio in the weathered carbonate bedrock (model layer 3) is less than in the unconsolidated sediments and is generally between 1 and 5 beneath the ash ponds (Figure 11b). The ratio is highest (lowest Kv values) in the southern and eastern portions of the model domain.

The calibrated values of hydraulic conductivity at wells MW-01, -04, -06, -07, and -09 were compared to the field data for these wells (Table 3). The modeled values of hydraulic conductivity for these five wells are generally consistent with the revised estimates of hydraulic conductivity (Table 3), with the greatest difference between the test data and the calibrated model seen at monitor wells MW-06 and MW-09. The differences between the field-measured and modeled values in these wells is about 50%, which is still within an acceptable range when considering that the representativeness of hydraulic conductivity estimates based on field slug-testing at specific points within an aquifer which can easily be an order-of-magnitude off of actual larger scale aquifer hydraulic conductivity. The calibrated model’s approximate values of horizontal hydraulic conductivity in the model cells containing and surrounding these monitor wells are:

- MW-01: 19 ft/d,
- MW-04: 27 ft/d,
- MW-06: 10 ft/d,
- MW-07: 8 ft/d, and
- MW-09: 12 ft/d.

These values are, overall, consistent with the estimates of hydraulic conductivity for these wells (Table 3).

5.2.2.2 Calibrated Water Budget

The model calibrated water budget is provided in Table 5. Groundwater recharge equals 20 af/yr (2,366 cfd), which is fairly consistent with the conceptual water budget estimate of 18 af/yr. Additionally, the GHB and recharge zone at the retention ponds and Ash Ponds provided 9 af/yr (1,030 cfd) to the groundwater budget. The total modeled inflow to groundwater is 28 af/yr (3,396 cfd).

Outflows from the groundwater model include discharge to the Des Plaines River and the CSSC. Discharge to the GHB representing the CSSC on the east side of the model equalled 8 af/yr (931 cfd), lower than the conceptual water budget estimate but represents the balanced water budget with spatially varying hydraulic conductivity. As previously discussed, the groundwater divide between westward and eastward flow occurs east of the Ash Ponds, and groundwater beneath the Ash Ponds flows to the west to the Des Plaines River. Outflows to the Des Plaines River equalled 21 af/yr (2,465 cfd), lower than the conceptual water budget estimate, but again, representing the balanced water budget with spatially varying hydraulic conductivity. The total outflows from the groundwater system balance the inflows at 28 af/yr (3,396 cfd) (Table 5).

5.2.2.3 Statistics and Residuals

The calibration residuals and modeled water level for each well is provided in Table 6. Calibration residuals for the site wells range from -0.25 ft in well MW-14 to 0.5 ft in well MW-13. The average residual is 0.06 ft (Table 7). The RMS error is 0.23 ft, or 8.7 percent of the change in hydraulic head across the model domain (Table 7), below the recommended threshold of 10 percent for the scaled RMS error (Anderson, 2015).

The sum of squared residuals (phi) for the calibration targets from the manual calibration was 14.2 square feet (ft^2), representing the starting point for the PEST calibration. The final, calibrated phi was 0.23 ft^2, representing a significant improvement of the calibration by the PEST software.

The modeled water level contours are shown on Figure 12. The modeled water level contours generally match the overall westward groundwater flow direction shown on the groundwater contour maps referenced above in Section 4.4. (i.e., Figures 9-7 through 9-10 of the Applications (KPRG, 2021, 2022)). This includes the expression of a gentler hydraulic gradient beneath the ash ponds, and the steeper hydraulic gradient along the western edge of Pond 2S. The calibration residuals for each calibration target (well) are shown on Figure 13. The overall model calibration to measured groundwater levels in site wells is very close, within one-half foot everywhere.

A scatter plot of the calibration residuals is provided for both all wells and site wells in Figure 14. In a perfect model calibration, each point would fall on a 1:1 line. Ideally deviations from the line should be balanced between high and low representing a lack of bias in the model calibration toward over- or under-prediction of the groundwater system. The calibration residuals for all wells are generally close to the 1:1 line, with the points falling both above and below the line, representing a relatively balanced, on whole, calibration to the site wells.

These results demonstrate that the model reasonably matches the overall groundwater elevations across the model domain, and the water balance reasonably represents the conceptual model of groundwater flow. The calibrated model is appropriate to use for basic predictive simulations.

5.3 Model Sensitivity

A sensitivity analysis was conducted as part of the model calibration. Calibrating the numerical model was an effort of refining the heterogeneity and distribution of the horizontal and vertical hydraulic conductivity values and the recharge to match measured water levels in the wells. During the PEST and manual trial-and-error calibration model runs, the model was the most sensitive to the values of hydraulic conductivity. The model calibration was particularly sensitive to the areas of higher hydraulic conductivity south and east of the ash ponds, which improved the model calibration to the site wells. The modeled values of hydraulic conductivity were determined during the PEST calibration and attempts to adjust the values consistently worsened the overall model calibration.

The model calibration is sensitive to the recharge rate, but to a lesser extent than it is to hydraulic conductivity. A sensitivity model run was conducted with recharge increased to 1.68 inches per year (in/yr) (3.84E-04 ft/d), or 4 percent of MAP. Water levels were raised in all monitoring well locations, and the scaled RMS error increased from 8.7 percent to 9.1 percent.

Sensitivity model runs were conducted to test the value of hydraulic conductivity of the more competent carbonate (model layer 4). Lowering the hydraulic conductivity to 0.07 ft/d from 0.15 ft/d had a large impact on the model calibration, particularly in raising the water levels in the unconsolidated sediments and increasing the scaled RMS error from 8.7 to 11.1 percent. Raising the hydraulic conductivity of the more competent carbonate (model layer 4) from 0.15 to 0.3 resulted in generally lower water levels in the model and worsened the scaled RMS error from 8.7 to 14.1 percent.

A sensitivity model run was conducted in which the horizontal hydraulic conductivity of the weathered carbonate unit (model layer 3) was uniformly set to 20 ft/d, the geometric mean of the field tests of permeability, and the vertical hydraulic conductivity was set to 2 ft/d. This test was designed to test the sensitivity of the model calibration to heterogeneity of the hydraulic conductivity within the weathered carbonate unit. With the uniform value of hydraulic conductivity for the weathered carbonate in model layer 3, water levels in the weathered carbonates were significantly lowered, and calibration worsened, with the scaled RMS error increasing to 45.5 percent.

A sensitivity model run was conducted in which the vertical hydraulic conductivity was set equal to the horizontal hydraulic conductivity. The calibrated values of vertical hydraulic conductivity are lower than the horizontal values, particularly in the unconsolidated sediments where the ratio is as high as 1:1,000 horizontal to vertical. With the vertical hydraulic conductivity set equal to the horizontal, the model calibration was only slightly affected. Water levels were lowered, particularly in the unconsolidated sediments, and the scaled RMS error increased to 8.9 percent from 8.7 percent.

From this sensitivity analysis it is determined that the calibrated set of modeled parameters are the most appropriate to represent site groundwater conditions and for use in predictive model simulations.

6.0 PREDICTIVE MODEL SIMULATIONS

Four predictive, contaminant transport model runs were conducted to demonstrate the impact to potential impacted groundwater from ash pond closure alternatives. The closure alternatives tested with the predictive model included combinations of removing all CCR materials and/or capping the ponds or encapsulating the ash in place. Closure management of all four ash ponds (Ponds 1N, 1S, 2S, and 3S) were tested concurrently with the predictive models. Transport modeling was performed using the software MT3D-USGS, a widely used and accepted version of the MT3D software designed to be compatible with MODFLOW-NWT.

The calibrated, steady state groundwater flow model was used as the basis for a hypothetical 100-year transport simulation of a surrogate constituent from each of the four ash ponds (Ponds 1N, 1S, 2S, and 3S). A uniform porosity of 35 percent was assumed for model layers 1 through 3, and a uniform value of 6 percent was assumed for the competent bedrock in model layer 4. To provide a platform upon which to evaluate potential closure alternatives, a hypothetical release from the four ash ponds was established. The hypothetical (artificial) release assumes that the ash ponds are full of ash and water with no liners present. The surrogate constituent was simulated by hypothetically introducing a concentration in groundwater of “1” beneath each of the four ash ponds, as shown on Figure 15. The hypothetical mass was defined in groundwater beneath the ash ponds using a constant source boundary condition with value of “1” and forward tracked for 100 years. Mass was moved through the groundwater system with advection and dispersion, and dispersion was simulated with a uniform value of 1 foot in the longitudinal direction, 0.1 ft in the transverse direction, and 0.01 ft in the vertical direction. The resulting hypothetical plume within the unconsolidated sediments and weathered bedrock is shown on Figure 16 and shows mass extending from the ash ponds to the Des Plaines River. The mass in groundwater at the ash ponds is continuous in these runs, therefore the mass is shown at the relative concentration of “1” beneath the ash ponds in all figures. This plume was the starting condition for the predictive scenarios of the conceptual closure alternatives for the ash ponds. The results of the predictive modeling for the four closure alternatives are provided on Figures 17 through 24.

6.1 Closure Alternative 1

Closure Alternative 1 simulates the removal of CCR materials from the ash ponds. In this scenario, the mass boundary condition was removed from the water table and the 100-year distribution of dissolved surrogate mass (Figure 16) was used as the initial concentrations. With this closure alternative, the distribution of dissolved contaminants that resulted from the hypothetical (artificial), continuous release of mass from the ash ponds was reduced over time within the unconsolidated sediments and weathered carbonates after the removal of the source mass at the ash ponds. These plumes are shown on Figure 17 at 5 and 25 years, and on Figure 18 at 50 and 100 years. As the figures show, the dissolved mass is reduced beneath each ash pond with the removal of the CCR materials. Relative concentrations downgradient of the ash ponds are reduced to less than approximately 0.7 within 5 years. Within 25 years the dissolved mass beneath and downgradient from Ash Ponds 1N and 1S is reduced to a relative concentration of less than 0.2 (Figure 17). Figure 18 shows relative concentrations at 50 years and shows further reduction in the area of shallow groundwater impacted with relative concentrations less than 0.2. By 100 years, the dissolved mass is effectively removed from shallow groundwater (Figure 18).

6.2 Closure Alternative 2

Closure Alternative 2 simulated the closure-in-place of the ash ponds. In this scenario, the hypothetical mass boundary condition remained at the water table, and recharge was simulated within the footprint of the ash ponds at a reduced rate of 1E-15 m/s (2.83E-10 ft/d), representing an impermeable designed and placed cap/cover system. The 100-year distribution of dissolved surrogate mass (Figure 16) was used as the initial concentrations.

The modeled results of Closure Alternative 2 on dissolved mass in the unconsolidated sediments and weathered bedrock are shown at 5 and 25 years on Figure 19, and at 50 and 100 years on Figure 20. Within 5 years relative concentrations in shallow groundwater are reduced to less than 0.7 downgradient of Ash Pond 1N and less than 0.9 downgradient of Ash Pond 1S (Figure 19). Relative concentrations have decreased by a change of about 10 percent to relative concentrations less than 0.4 downgradient of Ash Ponds 2S and 3S. Within 25 years relative concentrations have reduced below 0.3 downgradient of Ash Ponds 1N, 2S, and 3S, and below relative concentrations of approximately 0.8 downgradient of Ash Pond 1S (Figure 19). Relative concentrations are mostly stable after 25 years with little change at years 50 and 100 (Figure 20).

6.3 Closure Alternative 3

Closure Alternative 3 simulated the isolation/stabilization of the ash materials and closure-in-place at the ash ponds. In this scenario, as in Closure Alternative 2, the mass boundary condition remained at the water table, recharge through the ash ponds was simulated at a reduced rate to represent a placed cap/cover, and the 100-year distribution of dissolved surrogate mass (Figure 16) was used as the initial concentrations. Additionally, the four ash ponds were hydraulically isolated by defining a barrier wall with MODFLOW’s Horizontal Flow Barrier (HFB) package (Figure 21). The HFBs were defined with a hydraulic conductivity of 2.83E-04 ft/d and a thickness of 1 foot. The HFBs were extended through the base of the model layer 1. No-flow cells were defined beneath the ash ponds in model layer 2 to represent the vertical isolation of the ash material within the pond footprints.

The modeled results of Closure Alternative 3 are shown for unconsolidated sediments and weathered bedrock on Figure 22 at 5 and 25 years, and on Figure 23 at 50 and 100 years. By 5 years, relative concentrations have decreased downgradient of the Ash Ponds 1N and 1S to less than approximately 0.6, and to less than approximately 0.8 downgradient of Ash Pond 2S (Figure 22). By 25 years, the dissolved mass is mostly confined to the pond footprints, where the source mass is encapsulated by the HFBs and underlying no-flow boundaries. Relative concentrations less than approximately 0.1 to 0.2 remain downgradient of Ash Ponds 1N and 3S (Figure 22). There is little change to the downgradient dissolved mass by 50 years, and by 100 years, the dissolved mass is effectively removed from the shallow groundwater downgradient of the Ash Ponds (Figure 23).

6.4 Closure Alternative 4

Closure Alternative 4 simulated the removal of ash materials from Ash Ponds 2S and 3S which would be placed into Ponds 1 N and 1S followed by closure-in-place of the ash materials in ash ponds 1N and 1S. In this scenario, the mass boundary condition was removed from the water table beneath ash ponds 2S and 3S and remained beneath ash ponds 1N and 1S. Recharge was simulated within the footprint of ash ponds 1N and 1S at a reduced rate of 1E-15 m/s (2.83E-10 ft/d), representing an impermeable designed and placed cap/cover system. The 100-

year distribution of dissolved surrogate mass (Figure 16) was used as the initial concentrations. This model scenario is functionally the same as model scenario 1 for ash ponds 2S and 3S and the same as model scenario 2 for ash ponds 1N and 1S.

By 5 years, relative concentrations have decreased in groundwater in the unconsolidated sediments and weathered bedrock downgradient of Ash Ponds 2S and 3S (Figure 24). Maximum relative concentrations in shallow groundwater downgradient of these ash ponds are approximately 0.8 on the northern end of Ash Pond 2S (Figure 24). Relative concentrations have decreased by approximately 0.1 to 0.2 (relative change) downgradient of Ash Pond 1N (Figure 24). By 25 years, relative concentrations in shallow groundwater are below 0.1 beneath and downgradient of Ash Ponds 2S and 3S (Figure 24). Relative concentrations are below 0.3 in shallow groundwater downgradient of Ash Ponds 1N and 1S (Figure 24).

By 50 years the dissolved mass is effectively removed from shallow groundwater downgradient of Ash Ponds 2S and 3S (Figure 25). Relative concentrations in shallow groundwater downgradient of Ash Ponds 1N and 1S have mostly stabilized by 50 years to less than 0.3 and have not reduced further within 100 years (Figure 25).

6.5 Relation to Constituent Concentrations

The trends of predicted reduction in the surrogate mass concentrations discussed in Sections 6.1 through 6.4 for the four closure alternatives were related to the concentrations of several CCR constituents being monitored in groundwater that were detected at concentrations above their proposed Groundwater Protection Standards (GWPSs) during the 4th quarter 2022 groundwater monitoring event. Specifically, these were arsenic, boron, calcium, chloride, molybdenum, and sulfate. The concentrations of these constituents from the 4th quarter 2022 monitoring in downgradient monitoring wells were used as the starting concentrations for this evaluation. The percent decrease in the surrogate concentrations from the starting concentrations was calculated through the 100-year simulation for each closure alternative, at nine, downgradient CCR monitoring well locations MW-07 through MW-15 (Figure 26):

- MW-07, -14, and -15 downgradient of Ash Pond 1N,
- MW-08, -09 and -13 downgradient of Ash Pond 1S,
- MW-09, -10, -11 and -12 downgradient of Ash Ponds 2S and 3S

The relative reduction of the surrogate concentration over time can be related to the dissolved mass of any constituent by applying the percent decrease of the surrogate concentration to an initial concentration of a specific constituent of concern. As noted above, an initial concentration was assigned at each of these nine monitoring well locations for specific constituents of concern based on the 4th quarter 2022 sampling event as provided in Table 8. The *proposed* Section 845.600(a) GWPSs for each constituent for Ponds 1N, 1S, and 2S/3S are provided in Table 9 and are shown on the graphs in Figures 27 through 44.

The calculated percent decrease in the surrogate concentration over the 100-year model simulations was applied to the assigned initial concentration in each monitoring well. For example, the initial concentration (4th quarter 2022 sampling data) for arsenic in monitoring well MW-07 is 0.0032 milligrams per liter (mg/l) (Table 8). The initial, relative surrogate concentration in monitoring well MW-07 is 0.75 (relative to the source concentration of "1") (Figure 16). The decrease in the surrogate concentration throughout the 100-year closure scenario was calculated as a percentage of the initial, relative concentration in this monitoring well, and the percentage decrease was applied to the initial concentration of 0.0032 mg/l to yield a curve of decreasing arsenic concentrations for the model scenario. The resulting concentrations for each constituent of concern in each monitoring well was compared to the proposed Section 845.600(a) GWPSs for each constituent. The GWPSs are presented as dashed lines on each monitoring well's decay curve graph for each model scenario.

The decay curves for arsenic concentrations are shown on Figures 27, 28, and 29 for monitoring wells downgradient of Ash Ponds 1N, 1S, and 2S/3S, respectively for Closure Alternatives 1 through 4. The current concentrations of arsenic are below the proposed GWPSs for Ash Ponds 1N, 1S, and 2S/3S in all downgradient monitoring wells except MW-10 and MW-11. Therefore, all of the arsenic decay curves start below the dashed line representing the arsenic proposed GWPSs on Figures 27 through 29, except in monitoring wells MW-10 and MW-11. Arsenic concentrations decrease over time in all four model scenarios, including in monitoring wells MW-10 and MW-11 (Figure 29). Arsenic concentrations decrease below the proposed GWPS in monitoring wells MW-10 and MW-11 in all closure alternatives within approximately 4 to 15 years.

The decay curves for boron concentrations are shown on Figures 30, 31, and 32 for monitoring wells downgradient of Ash Ponds 1N, 1S, and 2S/3S, respectively for Closure Alternatives 1 through 4. The current concentrations of boron are below the proposed GWPSs for Ash Ponds 1N, 1S, and 2S/3S in all downgradient monitoring wells therefore, all of the boron decay curves start below the dashed line representing the boron GWPSs on Figures 30 through 32. Boron concentrations decrease over time in all four model scenarios.

The decay curves for calcium concentrations are shown on Figures 33, 34, and 35 for monitoring wells downgradient of Ash Ponds 1N, 1S, and 2S/3S, respectively for Closure Alternatives 1 through 4. The current concentrations of calcium are below the GWPSs for Ash Ponds 1N, 1S, and 2S/3S in all downgradient monitoring wells except MW-15, therefore, all of the calcium decay curves start below the dashed line representing the calcium GWPSs on Figures 33 through 35 except for monitoring well MW-15. Calcium concentrations decrease over time in all four model scenarios at all well locations. At well MW-15, the calcium concentration is reduced to below the proposed GWPS of 109.5 mg/l in all four scenarios within approximately 2 to 5 years (Figure 33).

The decay curves for chloride concentrations are shown on Figures 36, 37, and 38 for monitoring wells downgradient of Ash Ponds 1N, 1S, and 2S/3S, respectively for Closure Alternatives 1 through 4. The current concentrations of chloride are below the proposed GWPSs for Ash Ponds 1N, 1S, and 2S/3S in all downgradient monitoring wells except MW-09 in which the chloride concentration is equal to the proposed GWPS of 200 mg/l.

Therefore, all of the chloride decay curves start below the dashed line representing the chloride GWPSs on Figures 36 through 38 except for monitoring well MW-09. Chloride concentrations decrease over time in all four model scenarios. Chloride concentrations decrease below the proposed GWPS of 200 mg/l in monitoring well MW-09 in all closure alternatives within approximately 1 to 1.5 years (Figure 37).

The decay curves for molybdenum concentrations are shown on Figures 39, 40, and 41 for monitoring wells downgradient of Ash Ponds 1N, 1S, and 2S/3S, respectively for Closure Alternatives 1 through 4. The current concentrations of molybdenum are below the proposed GWPSs for Ash Ponds 1N, 1S, and 2S/3S in all downgradient monitoring wells except MW-08 in which the molybdenum concentration is slightly higher (0.11 mg/l) than the proposed GWPS of 0.1 mg/l. Therefore, all of the molybdenum decay curves start below the dashed line representing the molybdenum GWPSs on Figures 39 through 41 except for monitoring well MW-08. Molybdenum concentrations decrease over time in all four model scenarios. Molybdenum concentrations decrease below the proposed GWPS of 0.1 mg/l in monitoring well MW-08 in all closure alternatives within approximately 2 to 5 years (Figure 40).

The decay curves for sulfate concentrations are shown on Figures 42, 43, and 44 for monitoring wells downgradient of Ash Ponds 1N, 1S, and 2S/3S, respectively for Closure Alternatives 1 through 4. The current concentrations of sulfate are below the GWPSs for Ash Ponds 1N, 1S, and 2S/3S in all downgradient monitoring wells except MW-14 in which the sulfate concentration is higher (570 mg/l) than the proposed GWPS of 547.6 mg/l. Therefore, all of the sulfate decay curves start below the dashed line representing the sulfate GWPSs on Figures 42 through 44 except for monitoring well MW-14. Sulfate concentrations decrease over time in all four model scenarios. Sulfate concentrations decrease below the proposed GWPS of 547.6 mg/l in monitoring well MW-14 similarly in all closure alternatives within approximately 1.5 years (Figure 42).

7.0 SUMMARY

A numerical groundwater flow model was created for the vicinity of the four ash ponds at the Will County Generating Station. The model was calibrated to water levels in site wells to reasonably replicate the groundwater flow patterns beneath the site. Groundwater flow paths from the site and the ash ponds are predicted generally to the west toward the Des Plaines River. The model was used predictively to simulate a hypothetical release scenario to the underlying water table based upon which the effectiveness of engineering closure options can be evaluated. A hypothetical surrogate constituent was simulated beneath the four ash ponds in the groundwater. The hypothetical surrogate mass travelled with the groundwater flow paths toward the Des Plaines River. This hypothetical distribution of mass served as the initial concentrations to four predictive scenarios of mass removal or various closure in-place alternatives at the ash ponds. The hypothetical scenarios assume that the ash ponds are full of ash and water with no liner allowing for impacts to discharge constituents to the water table. The predictive scenarios of mass removal or various in-place closure scenarios then illustrate the relative reduction in the concentrations in groundwater as a result. In summary, the modeling results indicate that all four evaluated alternatives for closure of the ash ponds resulted in improvement to groundwater quality. For any parameter detections above proposed GWPSs, all four closure alternatives were found to reduce impacts to below the respective proposed GWPS. All alternatives also have a good overall long-term performance.

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TABLES

Table 1: Precipitation Data near Will County Station

Month	Average Monthly Precipitation (inches)[1,2]
January	2.18
February	2.02
March	2.80
April	4.30
May	5.01
June	4.86
July	4.22
August	4.53
September	3.27
October	3.71
November	2.39
December	2.27
Average Annual Precipitation[1]	42.0

Notes:

[1] Data were averaged for the periods of complete records available for the Romeoville Forecast Office station

[2] Periods of complete records were determined as months with 5 or less missing days and years without months with more than 5 missing days

Table 2: Compiled Borehole Lithology

Well Name/Identifier	From[1]	To[1]	Description	Lithology Group
	ft, bgs	ft, bgs		
121974178000	0	18	fill, clay	FILL
121974178000	18	120	limestone	Carbonates
121974178000	120	200	soft green shale	shale
121974281000	0	62	limestone	Carbonates
121974281000	62	71	limestone w/shale layers	Carbonates and Shale
121974281000	71	77	limestone	Carbonates
121974281000	77	79	limestone - shale mix	Carbonates and Shale
121974281000	79	128	limestone	Carbonates
121974281000	128	216	shale	shale
121973091600	0	3	sand & gravel	sand and gravel
121973091600	3	140	rock	Carbonates
121973091600	140	160	shale	shale
121973467500	0	15	clay & gravel	clay, sand, gravel
121973467500	15	145	rock	Carbonates
121973467500	145	180	shale	shale
121972436300	0	1	drift	sand
121972436300	1	145	lime	Carbonates
121972436300	145	239	shale & lime - Maquoketa	shale
121972438900	0	88	drift	sand
121972438900	88	153	lime	Carbonates
121972438900	153	218	sandy lime	Carbonates
121972438900	218	611	lime & shale	shale
121970352400	0	15	sandy clay	clay, sand
121970352400	15	39	gravel	sand and gravel
121970352400	39	42	broken limestone	Carbonates
121970352400	42	115	limestone	Carbonates
121970127500	135	315	Maquoketa	shale
121970025300	0	156	limestone	Carbonates
121970025300	156	317	Maquoketa	shale
121970184300	0	42	overburden	topsoil
121970184300	42	160	rock formation	Carbonates
121972479600	0	5	clay	clay
121972479600	5	145	limestone	Carbonates
121972583600	0	50	till	overburden
121972583600	50	60	limestone	Carbonates
121970127600	124	310	Maquoketa	shale
121974644100	0	3	Topsoil	topsoil
121974644100	3	20	clay-shale	clay
121974644100	20	49	dolomite	carbonates
121974634900	0	1	Sugar Run-Romeo Trans	carbonates
121974634900	1	21.6	Romeo Dolomite	carbonates
121974634900	21.6	23.1	Romeo-Markgraf Trans	carbonates
121974634900	23.1	43.7	Markgraf Trans	carbonates
121974634900	43.7	44.9	Markgraf-Brandon Bridge Trans	carbonates
121974634900	44.9	53	Brandon Bridge Dolomite	carbonates
121974482200	0	0.42	Asphalt 5"	
121974482200	0.42	1.25	Brown sand & gravel, damp (base) 10"	sand and gravel
121974482200	1.25	4	Fill	fill
121974482200	4	5	Brown limestone weathered	Carbonates
121974482200	5	15	Brown limestone	Carbonates
121974655800	0	0.5	black loam	loam
121974655800	0.5	1.42	yellow clayey silt & broken rock	silt and clay
121974655800	1.42	11.42	white limestone	Carbonates
121974655900	0	0.5	black loam	loam
121974655900	0.5	1	yellow clayey silt & broken rock	silt and clay
121974655900	1	11.25	white limestone	Carbonates
121974653200	0	1	soft black clayey loam with some pieces of rock	loam
121974653200	1	3.5	large pieces of rock with some clay	clay, sand, gravel
121974653200	3.5	8	silty hard gray clay with some rock fragments and gravel	clay, sand, gravel
121974653200	8	18.83	silty hard gray clay with some small to very large rock fragments	clay, sand, gravel
121974653200	18.83	19.17	white limestone	Carbonates
121974653200	19.17	24.5	silty hard gray clay with some small to very large rock fragments	clay, sand, gravel
121974653200	35	36	greenish white limestone with some seams of clay	Carbonates

Well Name/Identifier	From[1]	To[1]	Description	Lithology Group
	ft, bgs	ft, bgs		
121974655100	0	0.5	black loam	loam
121974655100	0.5	4.83	yellow clayey silt & broken rock	silt and clay
121974655100	4.83	15	white limestone	Carbonates
121974654900	0	0.67	soft black clay loam with some pieces of rock	loam
121974654900	0.67	5.42	very large pieces of yellow limestone	Carbonates
121974654900	5.42	49.25	white limestone	Carbonates
121974654900	49.25	54.25	very hard white-green & pink limestone	Carbonates
121974652500	0	0.5	black loam	loam
121974652500	0.5	1	yellow clayey silt and broken rock	silt and clay
121974652500	1	5.67	white limestone	Carbonates
121974652500	5.67	6	gray sandy silt	sand
121974652500	6	11	white limestone	Carbonates
121974650200	0	12	Silty clay sinkhole filling	fill
121974650200	12	24.2	dolomite	carbonates
121974648700	0	2.5	Weathered brown dolomite and clay	carbonates
121974648700	2.5	5.5	dolomite	carbonates
121974648700	8.6	31.3	dolomite	carbonates
121974622200	0	1.6	Sugar Run-Romeo Trans	carbonates
121974622200	1.6	23.6	Romeo Dolomite	carbonates
121974622200	23.6	25	Romeo-Markgraf Trans	carbonates
121974622200	25	46.6	Markgraf Dolomite	carbonates
121974622200	46.6	47.9	Markgraf-Brandon Bridge Trans	carbonates
121974622200	47.9	57.4	Brandon Bridge Dolomite	carbonates
121974281100	0	57	limestone	carbonates
121974281100	57	76	limestone with shale layers	Carbonates and Shale
121974281100	76	127	limestone	Carbonates
121974281100	127	130	shale	shale
121972552500	0	60	overburden	overburden
121972552500	60	120	rock formation	Carbonates
121973976800	0	12	gravel	sand and gravel
121973976800	12	110	limestone	Carbonates
121973976800	110	120	limestone & shale	Carbonates and Shale
121974053100	0	8	soil rock & clay	topsoil
121974053100	8	141	limestone, flowing well	Carbonates
121973630100	0	3	soil/clay/fill	fill
121973630100	3	15	dolomite	dolomite
121973629800	0	1	crushed limestone roadbase	fill
121973629800	1	8	clay	clay
121973629800	8	25	dolomite	carbonates
121974691400	0	18	clay	clay
121974691400	18	51	clay with fine gravel layers	clay, sand, gravel
121974691400	51	54	coarse caving gravel	sand and gravel
121974691400	54	92	clay with sand layers	clay, sand
121974691400	92	98	clay	clay
121974691400	98	111	limestone with fractures	Carbonates
121974691400	111	131	shale	shale
121974121000	0	4	clay	clay
121974121000	4	18	coarse gravel	sand and gravel
121974121000	18	50	fine gravel	sand and gravel
121974121000	50	147	limestone	Carbonates
121974121000	147	155	limestone & shale mix (hard)	Carbonates and Shale
121974121000	155	220	limestone	Carbonates
121973735700	0	25	clay & boulders	clay
121973735700	25	74	sand & fine gravel	sand and gravel
121973735700	74	125	white limestone	Carbonates
121973735700	125	150	hard gray shale	shale
MW-01	0	5	Fill: Black coal cinders, fine gravel, cobbles, crushed rock	Fill
MW-01	5	9	Gravel, weathered, limestone, silt	sand and gravel
MW-01	9	19	Weathered limestone bedrock	Carbonates
MW-02	0	7	Fill: Black coal ash, brown gravely clay, sand, gray silty clay	Fill
MW-02	7	8.5	Fill: Rubble	Fill
MW-02	8.5	12	Black coal cinders, coal dust, clay fill	Fill
MW-02	12	22	Weathered limestone bedrock	Carbonates
MW-03	0	7.5	FILL: Black coal ash, gravel, coarse sand, crushed rock, limestone, rubble	Fill
MW-03	7.5	10	GC: Gray gravel, silt	sand and gravel
MW-03	10	19.5	Weathered limestone bedrock	Carbonates

Well Name/Identifier	From[1]	To[1]	Description	Lithology Group
	ft, bgs	ft, bgs		
MW-04	0	6	FILL: Brown fine sand, black ash, crushed rock, fine to coarse gravel	Fill
MW-04	6	9	Gray silt, weathered limestone, moist to dry	Carbonates
MW-04	9	20	Limestone bedrock, weathered	Carbonates
MW-05	0	8	FILL: Brown silty clay, fine gravel, coarse gravel, crushed limestone	Fill
MW-05	8	9	GC: Brown gravel, clay, silty, wet	clay, sand, gravel
MW-05	9	20	Weathered limestone bedrock	Carbonates
MW-06	0	8	FILL: Crushed stone, brown medium sand, black coal cinders, dry	Fill
MW-06	8	10.5	CL: Gray silty clay, coarse to fine gravel, trace coarse	clay, sand, gravel
MW-06	10.5	18	Weathered limestone bedrock	Carbonates
MW-07	0	3.5	FILL: Crushed stone, gravel, silt, sand	Fill
MW-07	3.5	7	FILL: Rock rubble, dry	Fill
MW-07	7	8.5	GC: Brown gravel, silt, coarse sand, saturated	sand and gravel
MW-07	8.5	18	Weathered limestone bedrock	Carbonates
MW-08	0	0.5	CL: Dark brown clayey silt, dry	Silt and Clay
MW-08	0.5	5.5	FILL: Coarse gravel, crushed rock, dry	Fill
MW-08	5.5	7	FILL: Crushed rock, silty gravel	Fill
MW-08	7	19	Weathered limestone bedrock	Carbonates
MW-09	0	5	FILL: Crushed rock, coarse sand, some silt	Fill
MW-09	5	6	FILL: Some brown silty clay	Fill
MW-09	6	10.5	GC: Gray silty clay, fine and coarse gravel, some coarse sand	clay, sand, gravel
MW-09	10.5	11.5	GC: Clayey gravel	clay, sand, gravel
MW-09	11.5	19	Weathered limestone bedrock	Carbonates
MW-10	0	10	FILL: Crushed Limestone, silt, gravel	Fill
MW-10	10	12	GC: Weathered limestone, clay, sand, gravel	clay, sand, gravel
MW-10	12	20	Weathered limestone bedrock	Carbonates
MW-11	0	1	Roadway of sand and gravel	sand and gravel
MW-11	1	2	Sand and Gravel, Dark brown, fine to medium, silty, dry	sand and gravel
MW-11	2	3	Clay, brown, with sand and gravel, slightly moist	clay, sand, gravel
MW-11	3	7.5	Gravel, limestone/dolomite, dry to slightly moist	sand and gravel
MW-11	7.5	13	Clay, dark brown and black, silty, some sand and gravel, moist	clay, sand, gravel
MW-11	13	22	Weathered Bedrock, dolomite	Carbonates
MW-12	0	1	Roadway of sand and gravel	Fill
MW-12	1	2	Sand, Black, Brown, fine to medium, silty, dry	sand
MW-12	2	4	Clay with Gravel, slightly moist	clay, sand, gravel
MW-12	4	4	Gravel layer	sand and gravel
MW-12	4	7	Clay with Gravel, slightly moist	clay, sand, gravel
MW-12	7	11.5	Silty Sand, fine to medium, black, moist	sand
MW-12	11.5	12	Silty sand, tan to white, fine to medium, wet	sand
MW-12	12	13.5	Silty Sand, brown, medium to coarse, wet	sand
MW-12	13.5	15.5	Silt and clay, dark gray, trace sand and gravel, very soft wet	silt and clay
MW-12	15.5	20	Clay, white, light greenish gray, orange mottled, moist	clay
MW-13	0	1	Brown/Tan Silty Sand	sand
MW-13	1	2	Gray/Brown Silty Sand and Gravel, trace clay, slightly moist	sand
MW-13	2	10	Tan fine sand and gravel, slightly moist	sand and gravel
MW-13	10	16	White Dolomite bedrock, fractured	Carbonates
MW-14	0	1	Brown cobbles, black silty sand, slightly moist	Fill
MW-14	1	5	Black silty sand, travel road gravel, trace clay, slightly moist	sand
MW-14	5	7.5	Increase Gravel	sand and gravel
MW-14	7.5	12	Increase sand	sand and gravel
MW-14	12	16	White Dolomite bedrock	Carbonates
MW-15	0	4	Black and dark brown silty sand, some cobbles, slightly moist	sand
MW-15	4	6	White and tan gravel	sand and gravel
MW-15	6	9	Black silty sand with red brick pieces, moist. Wet at 8 feet	sand
MW-15	9	12	Weathered bedrock and gray silty clay	Carbonates
MW-15	12	16	Tan Dolomite, cherty	Carbonates

Notes:

[1] Depth intervals in feet below ground surface

Table 3: Hydraulic Conductivity Data for Site Wells

Well Name	Screened Depth	Screened Geology	Test Name	2011 Hydraulic Conductivity Estimate		2021 Hydraulic Conductivity Estimate		
	ft bgs			ft/s	ft/d	ft/s	ft/d	geometric mean (ft/d)
MW-01	9 -19	Limestone	U1	8.31E-04	70	3.57E-04	30	24.5
			D1	2.25E-04	20	2.60E-04	20	
MW-04	9.5 - 19.5	Limestone	U2	4.80E-04	40	3.36E-04	30	24.5
			D1	4.53E-04	40	2.06E-04	20	
MW-06	8 - 18	Limestone	U2	3.98E-04	30	1.64E-04	10	20
			D1	3.84E-04	30	4.35E-04	40	
MW-07	7.5 - 17.5	Limestone	U2	2.07E-04	20	2.11E-04	20	14.1
			D2	6.38E-05	10	6.07E-05	10	
MW-09	9 - 19	Limestone	U1	1.22E-03	110	5.42E-04	50	22.4
			D1	6.12E-05	10	9.80E-05	10	

Notes:
ft bgs = feet below ground surface
ft/d = feet per day
ft/s = feet per second

Table 4: Groundwater Elevation Data

	MW-01	MW-02	MW-03	MW-04	MW-05	MW-06	MW-07	MW-08	MW-09	MW-10	MW-11	MW-12	MW-13	MW-14	MW-15
Groundwater Elevation:															
Minimum (ft)	581.84	581.75	581.36	581.45	581.70	580.61	580.92	579.95	580.56	579.13	579.48	579.66	581.50	581.35	581.87
Maximum (ft)	584.01	584.11	584.51	584.25	584.14	583.01	583.33	582.97	583.52	582.07	582.60	581.64	582.95	582.47	584.17
1st Quartile (ft)	582.53	582.42	582.60	582.15	582.45	581.33	581.48	581.05	581.11	579.93	580.05	580.18	581.78	581.61	582.27
3rd Quartile (ft)	583.31	583.30	583.32	582.94	583.14	582.04	582.38	581.83	582.41	580.63	580.83	580.65	581.95	582.06	582.84
IQR (ft)	0.78	0.89	0.72	0.79	0.69	0.71	0.90	0.78	1.30	0.70	0.78	0.46	0.17	0.45	0.57
Lower Bound (ft)	581.35	581.08	581.52	580.95	581.41	580.27	580.12	579.87	579.15	578.88	578.88	579.49	581.52	580.94	581.40
Upper Bound (ft)	584.49	584.63	584.41	584.13	584.18	583.10	583.74	583.01	584.37	581.68	582.00	581.34	582.21	582.74	583.70
Average (ft)[1]	582.95	582.89	582.89	582.59	582.82	581.74	581.98	581.47	581.74	580.27	580.37	580.40	581.86	581.82	582.50

Notes:

ft = feet

IQR = Interquartile range

[1] The calculated average water level was used as the calibration head target in the numerical groundwater flow model

Table 5: Calibrated Water Budget

Component	Conceptual Flux	Modeled Flux	
	af/yr	af/yr	cfd
INFLOWS			
Recharge	18	20	2,366
Infiltration through retention and ash ponds		9	1,030
Total Inflows		28	3,396
OUTFLOWS			
Discharge to Des Plaines River	40	21	2,465
Discharge to CSSC	33	8	931
Total outflows		28	3,396

Notes:

af/yr = acre-feet per year

cfd = cubic feet per day

CSSC = Chicago Sanitary and Ship Canal

Table 6: Calibration Residuals

Well	Easting	Northing	Target Value[1]	Modeled Water Level	Residual
	NAD83, State Plane, IL East, ft		ft	ft	ft
MW-01	1057345.6	1809996.0	582.95	582.94	0.01
MW-02	1057227.4	1809764.1	582.89	582.86	0.03
MW-03	1057288.7	1809532.1	582.89	582.89	0.00
MW-04	1057266.8	1809357.1	582.59	582.59	0.00
MW-05	1057262.4	1809173.3	582.82	582.50	0.32
MW-06	1057253.7	1808915.1	581.74	581.85	-0.11
MW-07	1057013.0	1809947.9	581.98	582.05	-0.07
MW-08	1056894.8	1809466.5	581.47	581.54	-0.07
MW-09	1056851.2	1809244.1	581.74	581.34	0.40
MW-10	1056798.0	1808931.7	580.27	580.32	-0.05
MW-11	1056809.2	1809070.5	580.37	580.53	-0.16
MW-12	1056797.4	1808740.8	580.40	580.47	-0.07
MW-13[2]	1056860.1	1809334.5	581.86	581.36	0.50
MW-14[2]	1056945.2	1809726.9	581.82	582.07	-0.25
MW-15[2]	1057062.7	1810105.3	582.50	582.08	0.42

Notes:

ft = feet

[1] The target value for site-specific wells is the long-term average of measured water levels

Table 7: Calibration Statistics

Parameter	
Average Residual (ft)	0.06
Minimum Residual (ft)	-0.25
Maximum Residual (ft)	0.50
Sum of Squared Residuals (ft^2)	0.81
RMS Error (ft)	0.23
%RMS[1]	8.7%

Notes:

ft = feet

ft^2 = feet squared

RMS = root mean squared

[1] Calculated by dividing the RMS error by the range in measurec

Table 8: Fourth Quarter Sampling Results for Constituents of Concern in Downgradient CCR Monitoring Wells

Monitoring Well	Arsenic	Boron	Calcium	Chloride	Molybdenum	Sulfate	Pond
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	
MW-07	0.0032	3	59	140	0.087	440	1N
MW-08	0.014	3.5	110	120	0.11	500	1S
MW-09	0.0093	2.4	37	200	0.068	180	1S
MW-10	0.015	4.4	130	160	0.097	220	2S/3S
MW-11	0.013	3.8	120	130	0.052	66	2S/3S
MW-12	0.0017	2.3	160	180	0.029	180	2S/3S
MW-13	0.0015	1.6	140	160	0.017	400	1S
MW-14	0.0024	3.1	83	120	0.073	570	1N
MW-15	0.0038	4.1	170	120	0.03	480	1N

Notes:

CCR = Coal Combustion Residuals

mg/l = miligrams per liter

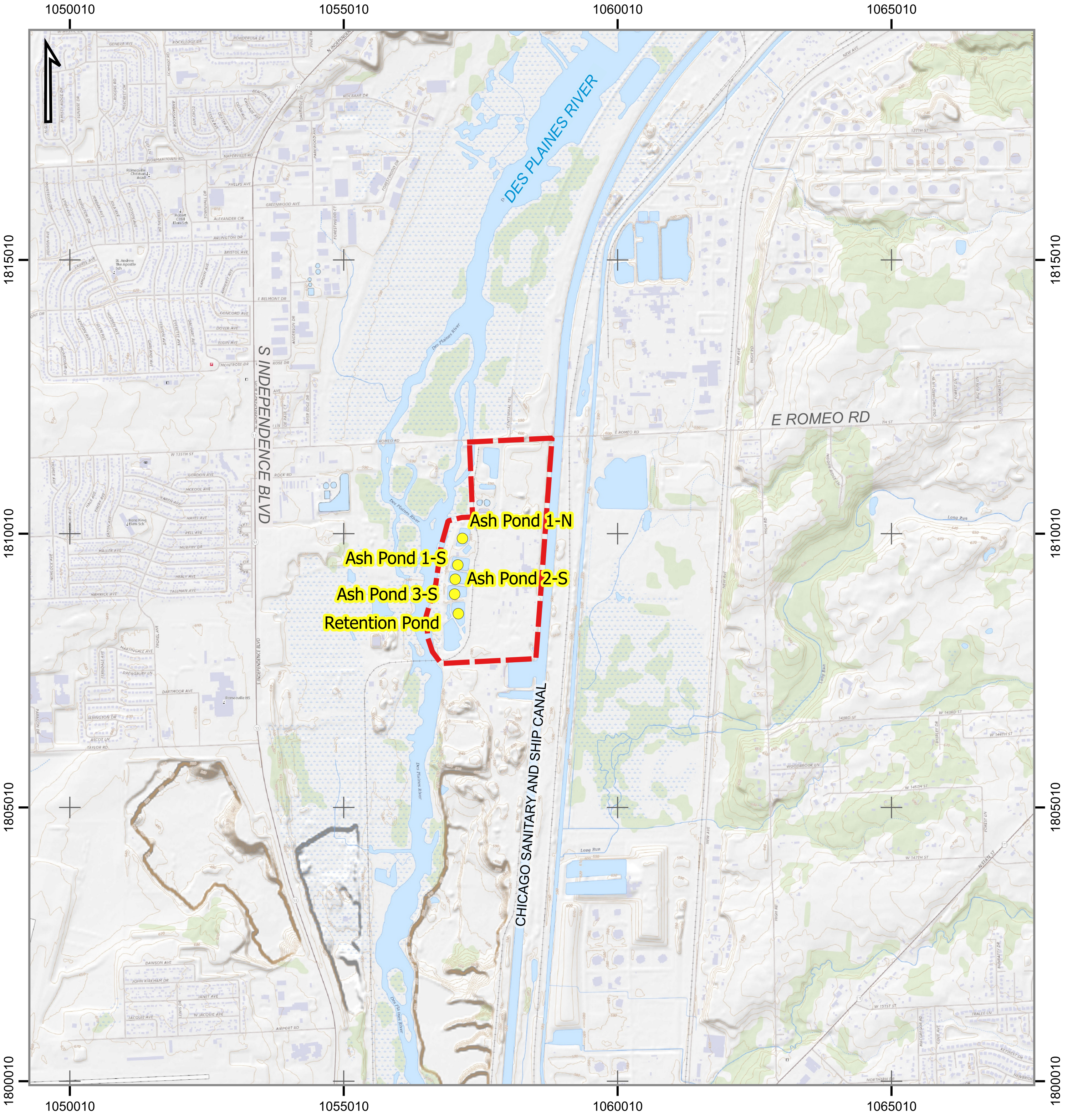
Table 9: Proposed Groundwater Protection Standards

Ash Pond	Arsenic	Boron	Calcium	Chloride	Molybdenum	Sulfate
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
1N	0.01	6.5	109.5	200	0.1	547.6
1S	0.017	6.97	362	200	0.1	1217
2S/3S	0.01	4.739	313.4	200	0.172	1053

Notes:

mg/l = miligrams per liter

FIGURES



LEGEND

🟥 APPROXIMATE SITE BOUNDARY

0 0.5 mi

FEET

Coordinate System:
NAD_1983_StatePlane_Illinois_East_FIPS_1201_Feet
Project File: Figure1_LocationMap.qgz

BAS GROUNDWATER CONSULTING

KPRG

CLIENT
MIDWEST GENERATION

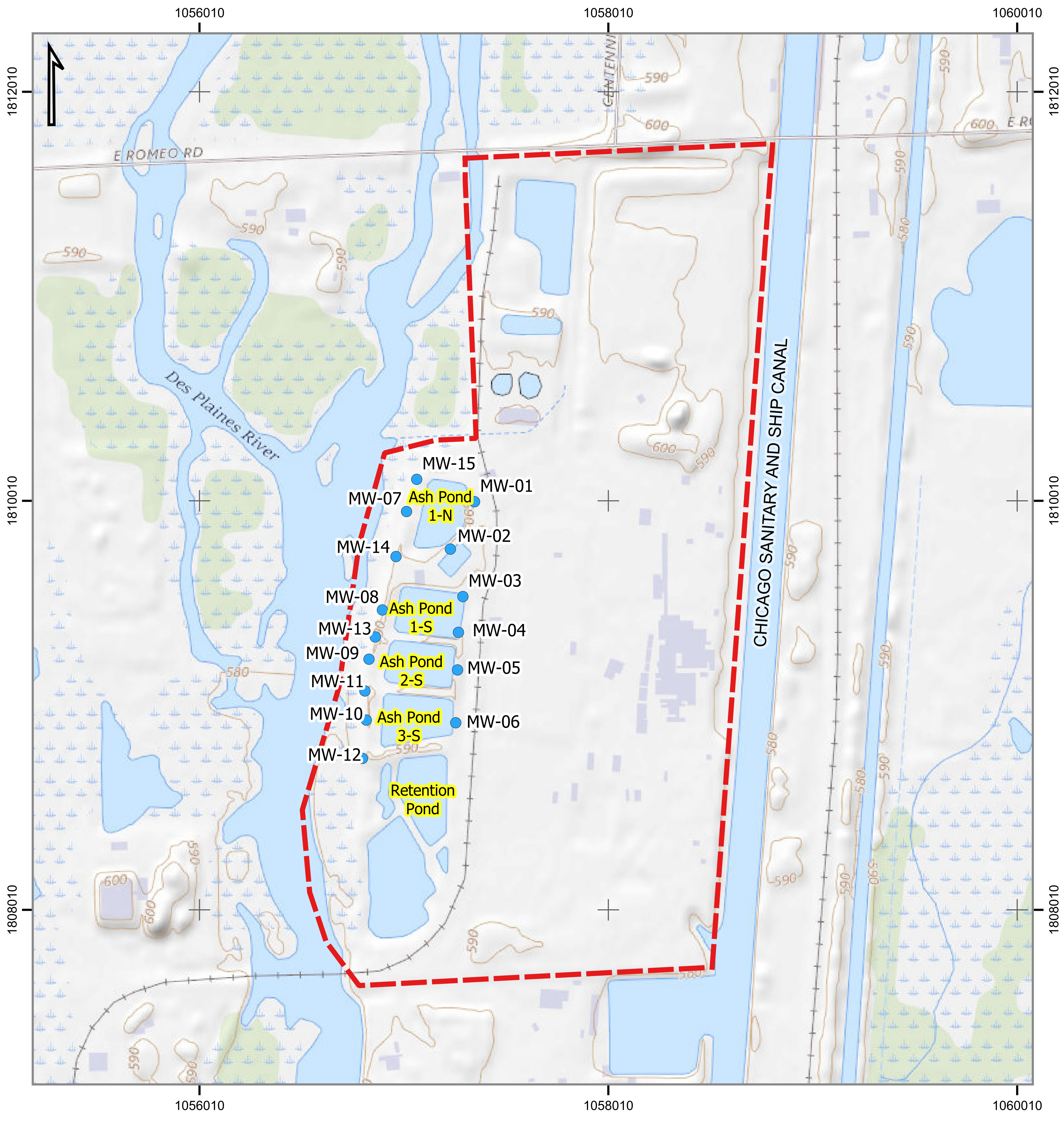
SITE
WILL COUNTY
529 OLD ROMEO RD, ROMEOVILLE, IL

TITLE
LOCATION MAP

SCALE AT ANSI A 1:30,000	DRAWN	DZF	03/29/2023
	CHECKED	BAS	03/29/2023

BAS PROJECT No.
21141501

FIGURE:
1



LEGEND

● SITE MONITORING WELL

▭ APPROXIMATE SITE BOUNDARY

0 400 800 ft

FEET

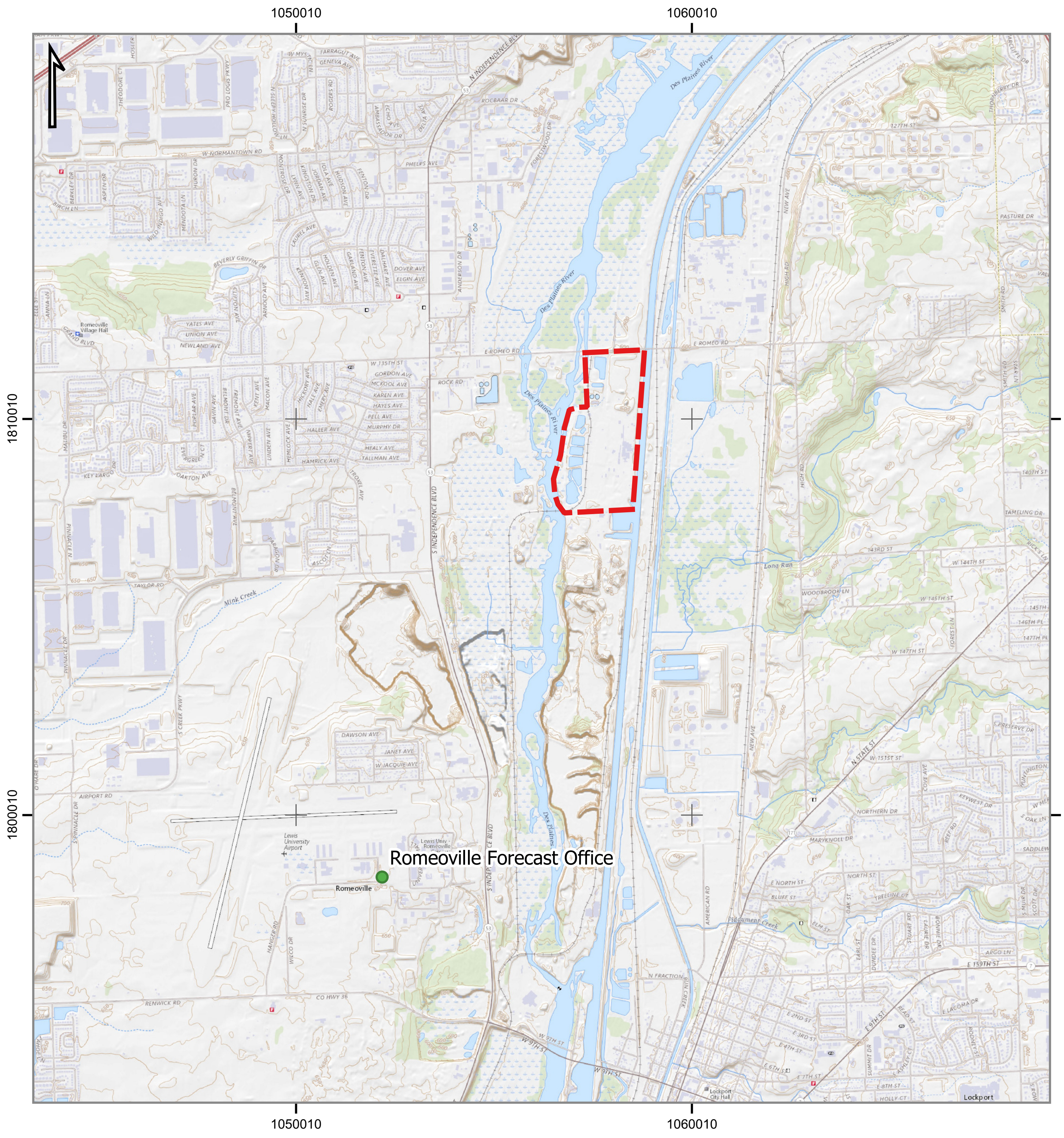
Coordinate System:
NAD_1983_StatePlane_Illinois_East_FIPS_1201_Feet
Project File: Figure2_SiteWells.qgz

BAS GROUNDWATER CONSULTING

K P R G

CLIENT	MIDWEST GENERATION
SITE	WILL COUNTY 529 OLD ROMEO RD, ROMEOVILLE, IL
TITLE	**WILL COUNTY STATION SITE MONITORING WELLS**

SCALE AT ANSI A 1:8,000	DRAWN	DZF	05/09/2023
	CHECKED	BAS	05/09/2023
BAS PROJECT No. 21141501	FIGURE: 2		



LEGEND

● CLIMATE STATION

🟥 APPROXIMATE SITE BOUNDARY

0 2,000 4,000 ft
FEET

Coordinate System:
NAD_1983_StatePlane_Illinois_East_FIPS_1201_Feet
Project File: Figure3_ClimateStations.qgz

BAS GROUNDWATER CONSULTING
KPRG

CLIENT
MIDWEST GENERATION

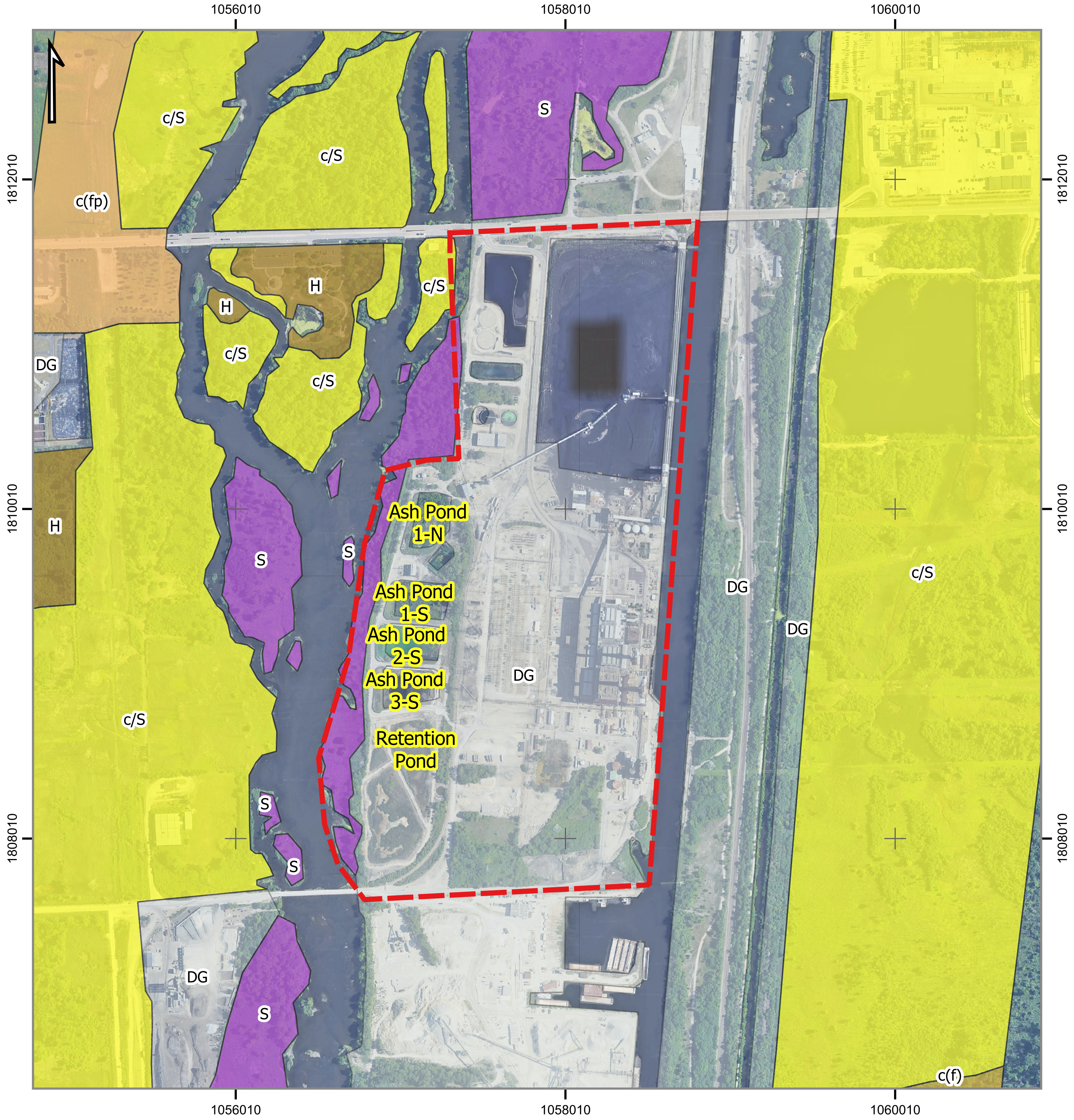
SITE
WILL COUNTY
529 OLD ROMEO RD, ROMEOVILLE, IL

TITLE
CLIMATE STATIONS NEAR WILL COUNTY STATION

SCALE AT ANSI A	DRAWN	DZF	01/11/2023
1:42,000	CHECKED	BAS	01/11/2023

BAS PROJECT No.
21141501

FIGURE:
3



LEGEND

🟥 APPROXIMATE SITE BOUNDARY

SURFACE GEOLOGY

⬜ DISTURBED GROUND (DG)

🟪 SILURIAN BEDROCK (S) (DOLOMITE)

🟨 CAHOKIA FORMATION (c/S)

🟨 CAHOKIA FORMATION, FAN (c(f))

🟫 HENRY FORMATION (H)

🟧 CAHOKIA FORMATION, FLOODPLAIN (c(fp))

0 500 1,000 ft

FEET

Coordinate System:
NAD_1983_StatePlane_Illinois_East_FIPS_1201_Feet
Project File: Figure4_Geology.qgz

BAS GROUNDWATER CONSULTING

K P R G

CLIENT
MIDWEST GENERATION

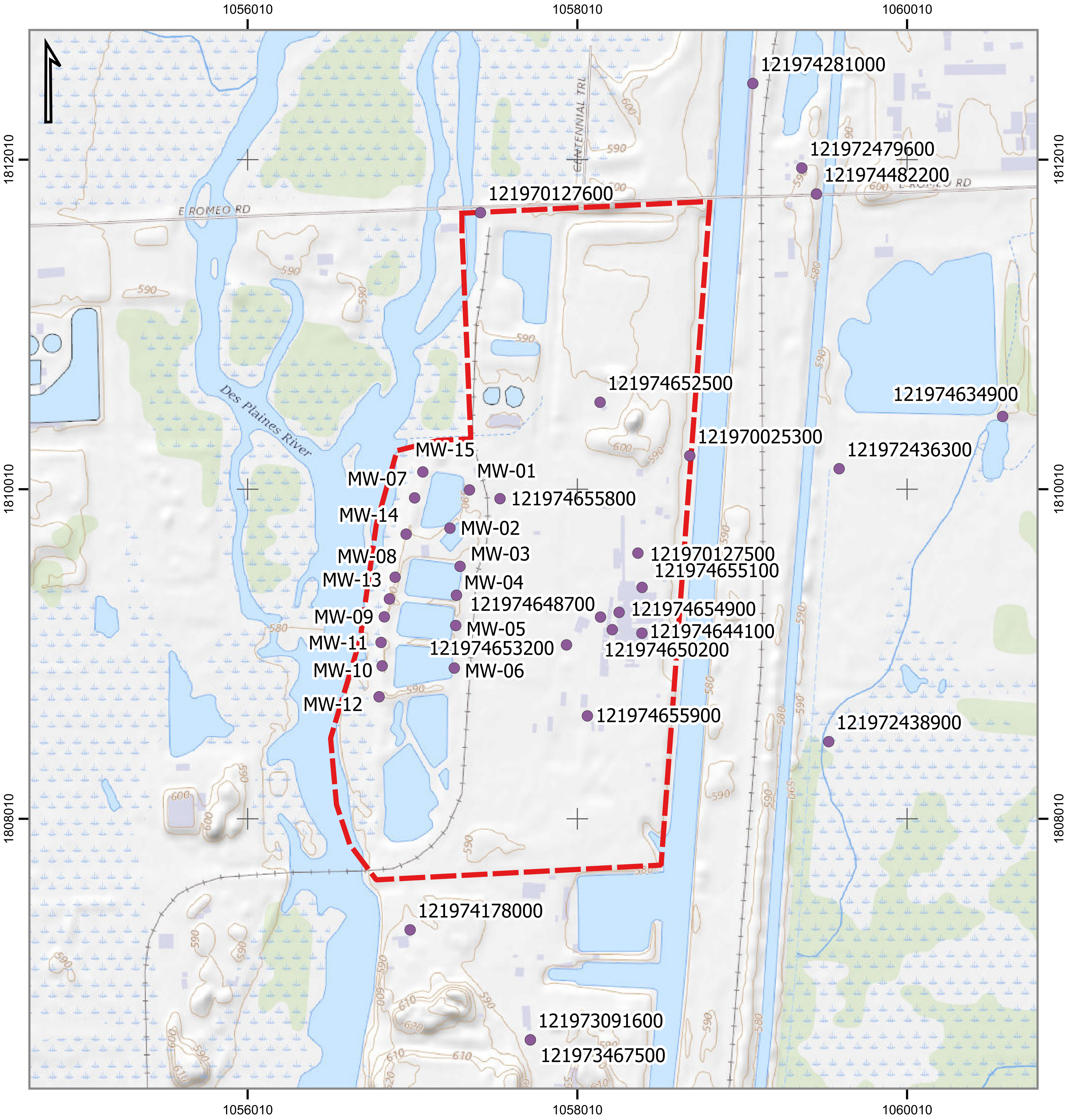
SITE
WILL COUNTY
529 OLD ROMEO RD, ROMEOVILLE, IL

TITLE
SURFACE GEOLOGY

SCALE AT ANSI A	DRAWN	DZF	03/29/2023
1:10,000	CHECKED	BAS	03/29/2023

BAS PROJECT No. 21141501

FIGURE: 4



LEGEND

🟥 APPROXIMATE SITE BOUNDARY

● WELLS WITH BOREHOLE LITHOLOGY DATA

0 500 1,000 ft

FEET

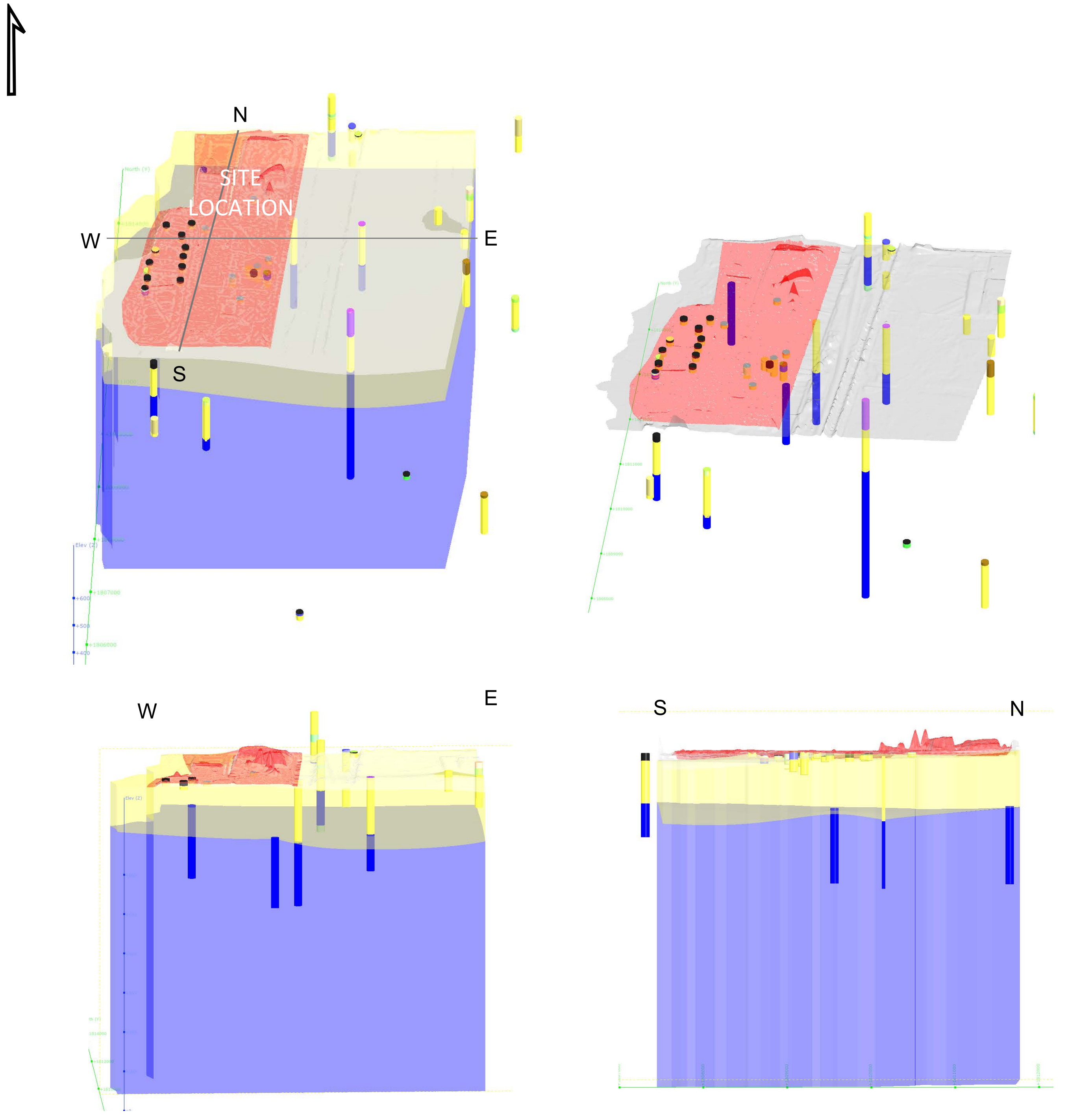
Coordinate System:
NAD_1983_StatePlane_Illinois_East_FIPS_1201_Feet
Project File: Figure5_WellsWBoreholes.qgz

BAS GROUNDWATER CONSULTING

K P R G

CLIENT	MIDWEST GENERATION
SITE	WILL COUNTY 529 OLD ROMEO RD, ROMEOVILLE, IL
TITLE	**WELLS WITH BOREHOLE LITHOLOGY DATA**

SCALE AT ANSI A 1:10,000	DRAWN	DZF	01/11/2023
	CHECKED	BAS	01/11/2023
BAS PROJECT No. 21141501		FIGURE: **5**	



LEGEND

Leapfrog_Geology

- ■ Fill
- ■ overburden
- ■ topsoil
- ■ loam
- ■ clay, sand
- ■ silt and clay
- ■ clay
- ■ clay, sand, gravel
- ■ sand
- ■ sand and gravel
- ■ dolomite
- ■ carbonates
- ■ carbonates and shale
- ■ shale

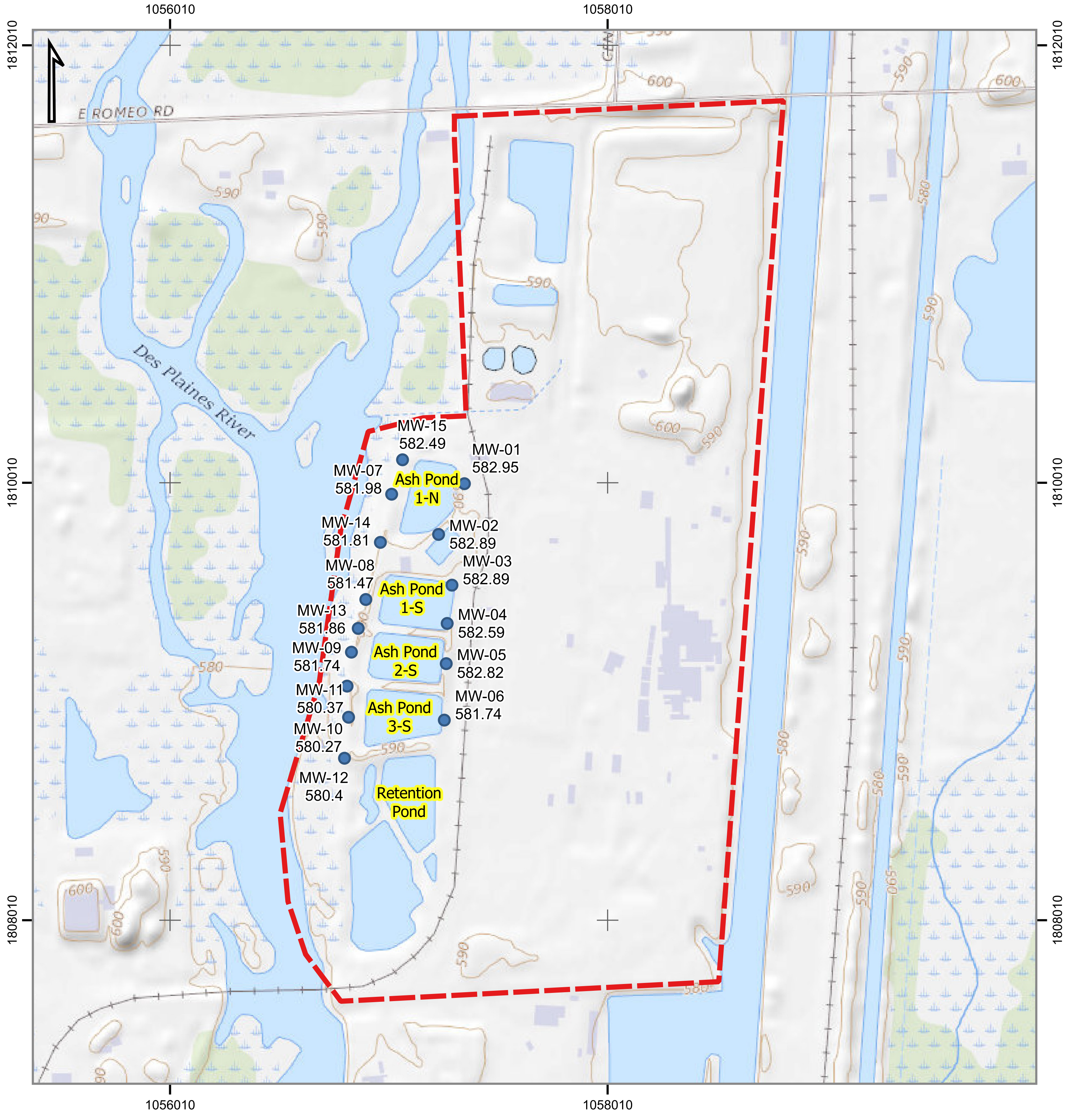
Coordinate System:
NAD_1983_StatePlane_Illinois_East_FIPS_1201_Feet
Project File: Figure6_LeapfrogGeology.qgz

BAS GROUNDWATER CONSULTING

K P R G

CLIENT	MIDWEST GENERATION
SITE	WILL COUNTY 529 OLD ROMEO RD, ROMEOVILLE, IL
TITLE	**BOREHOLE LITHOLOGY DATA**

SCALE AT ANSI A	*DRAWN*	*DZF*	01/11/2023
	CHECKED	*BAS*	01/11/2023
BAS PROJECT No.	*21141501*	*FIGURE:*	**6**



LEGEND

● AVERAGE WATER LEVEL ELEVATION (FT, AMSL)

🟥 APPROXIMATE SITE BOUNDARY

0 400 800 ft

FEET

Coordinate System:
NAD_1983_StatePlane_Illinois_East_FIPS_1201_Feet
Project File: Figure7_WellsWWaterLevelData.qgz

BAS GROUNDWATER CONSULTING

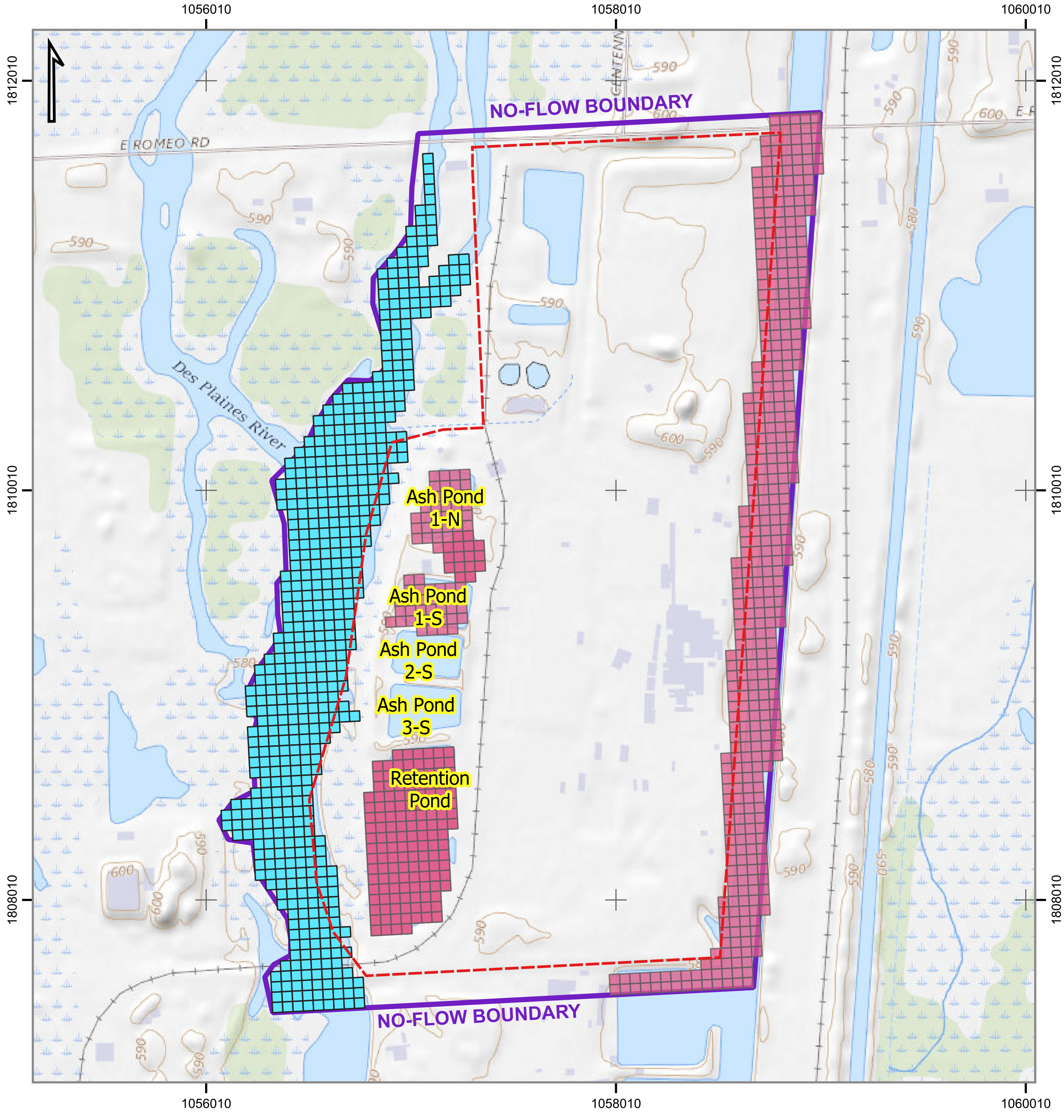
K P R G

CLIENT
MIDWEST
GENERATION

SITE
WILL COUNTY
529 OLD ROMEO RD, ROMEOVILLE, IL

TITLE
WELLS WITH WATER
LEVEL DATA

SCALE AT ANSI A 1:7,500	DRAWN	DZF	01/11/2023
	CHECKED	BAS	01/11/2023
BAS PROJECT No. 21141501	FIGURE: 7		



LEGEND

□ MODEL BOUNDARY
🟥 GENERAL HEAD BOUNDARY
🟦 RIVER BOUNDARY
⬚ APPROXIMATE SITE BOUNDARY

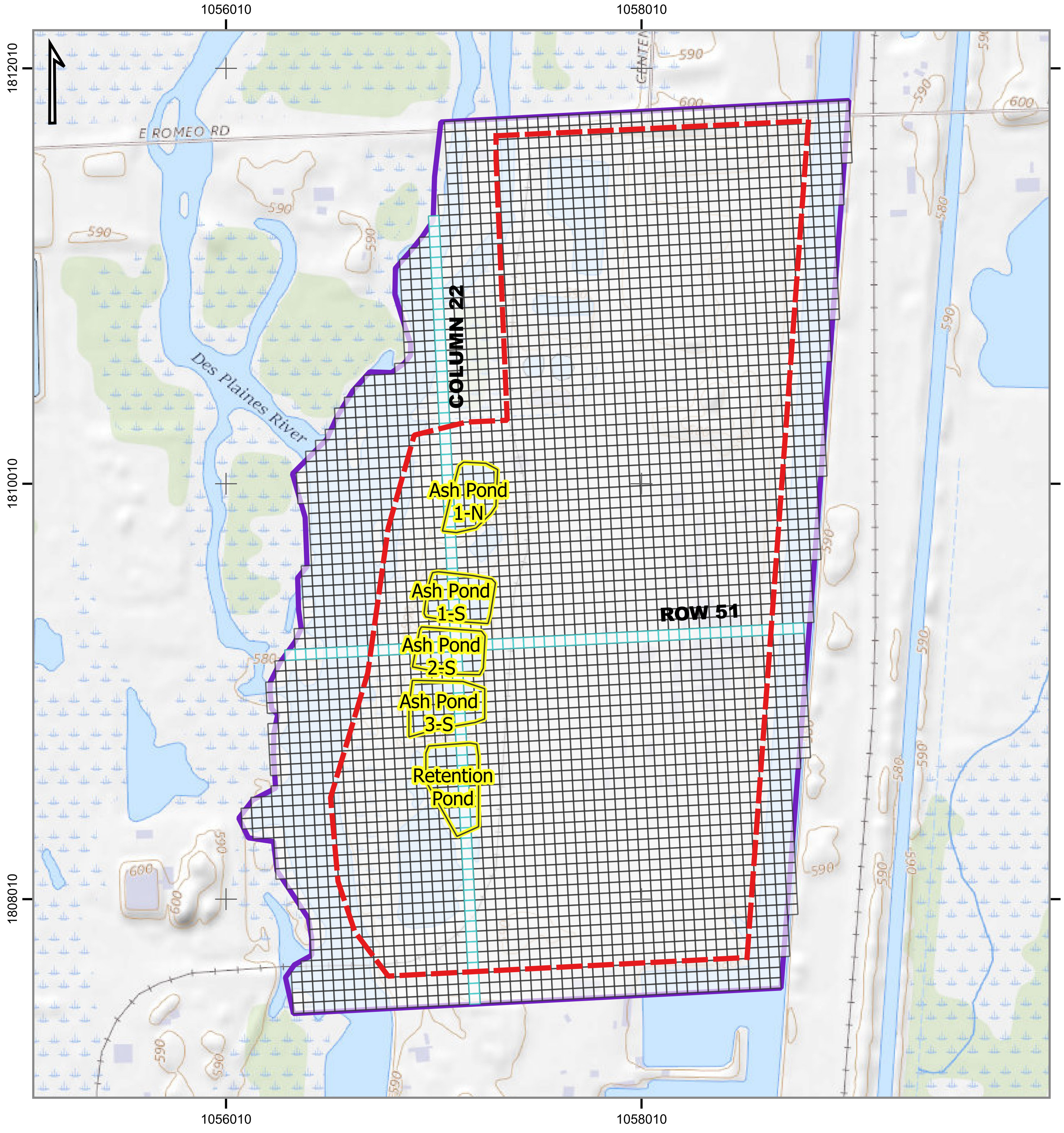
0 400 800 ft
FEET

Coordinate System:
NAD_1983_StatePlane_Illinois_East_FIPS_1201_Feet
Project File: Figure8_ModelBoundary.qgz

BAS GROUNDWATER CONSULTING
KPRG

CLIENT	MIDWEST GENERATION
SITE	WILL COUNTY 529 OLD ROMEO RD, ROMEOVILLE, IL
TITLE	**MODEL BOUNDARY CONDITIONS**

SCALE AT ANSI A	DRAWN	DZF	03/20/2023
1:8,000	CHECKED	BAS	03/20/2023
BAS PROJECT No.	21141501	FIGURE:	8



LEGEND

▭ MODEL BOUNDARY

▭ MODEL GRID

⌐ ¬ APPROXIMATE SITE BOUNDARY

HIGHLIGHTED SECTIONS SHOWN ON FIGURE 10

0 400 800 ft
FEET

Coordinate System:
NAD_1983_StatePlane_Illinois_East_FIPS_1201_Feet
Project File: Figure9_ModelGrid.qgz

BAS GROUNDWATER CONSULTING

KPRG

CLIENT
MIDWEST
GENERATION

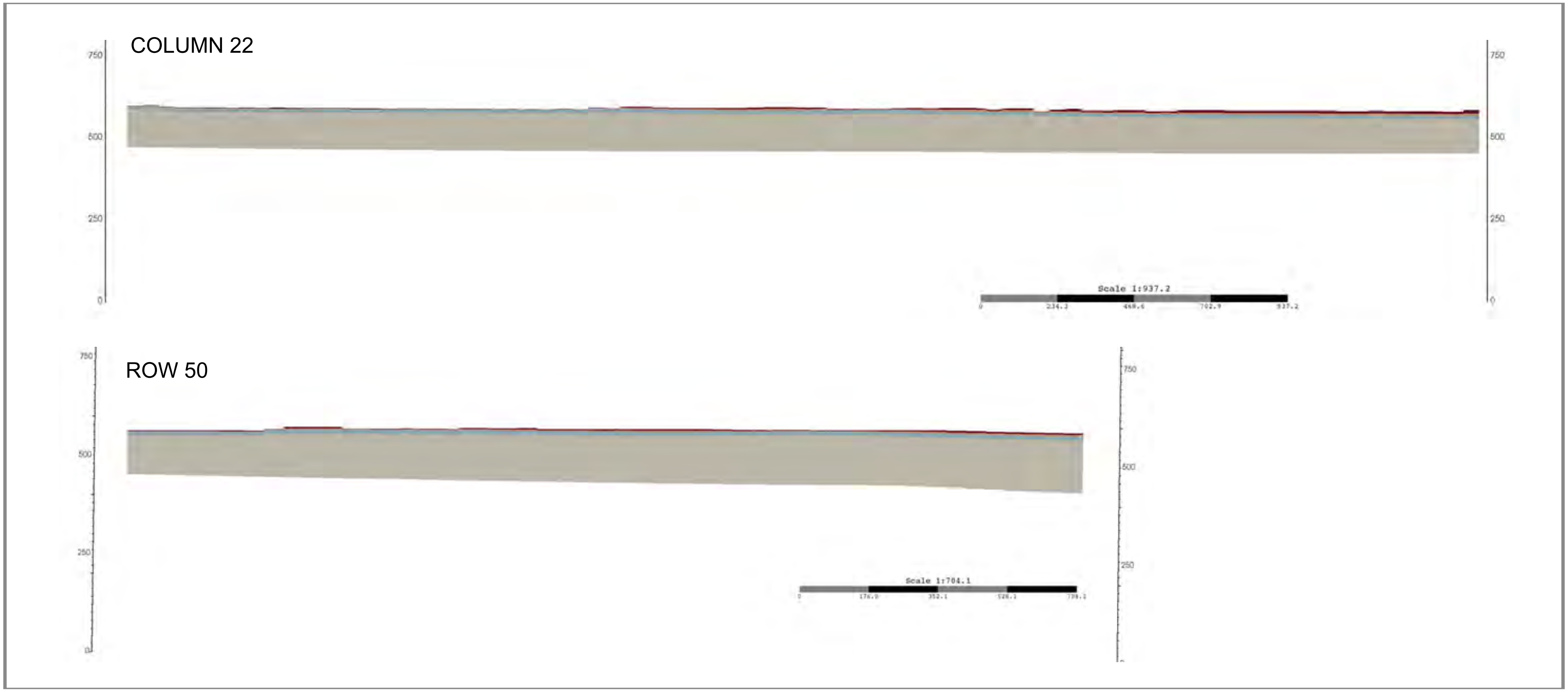
SITE
WILL COUNTY
529 OLD ROMEO RD, ROMEOVILLE, IL

TITLE
MODEL GRID

SCALE AT ANSI A 1:8,000	*DRAWN*	*DZF*	03/29/2023
	CHECKED	*BAS*	03/29/2023

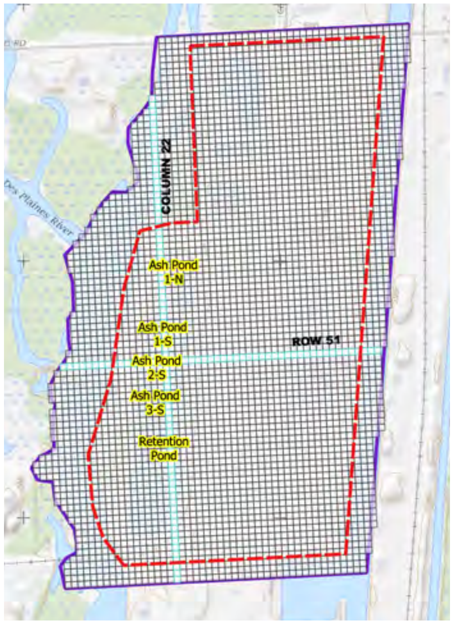
BAS PROJECT No. *21141501*

FIGURE: **9**



LEGEND

- 🟥 LAYER 1
- 🟥 LAYER 2
- 🟧 LAYER 3
- 🟦 LAYER 4



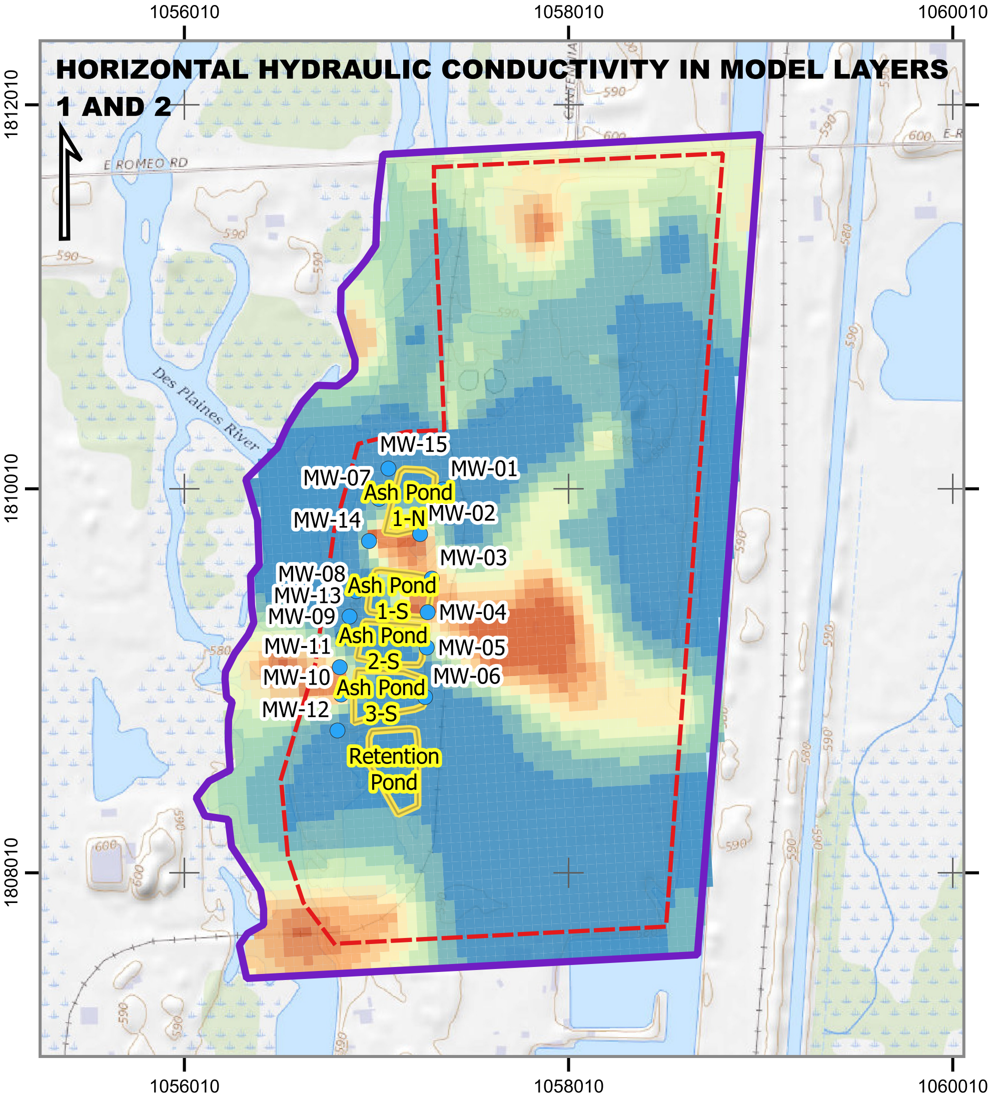
Coordinate System:
NAD_1983_StatePlane_Illinois_East_FIPS_1201_Feet
Project File: Figure10_ModelLayering.qgz

BAS GROUNDWATER CONSULTING

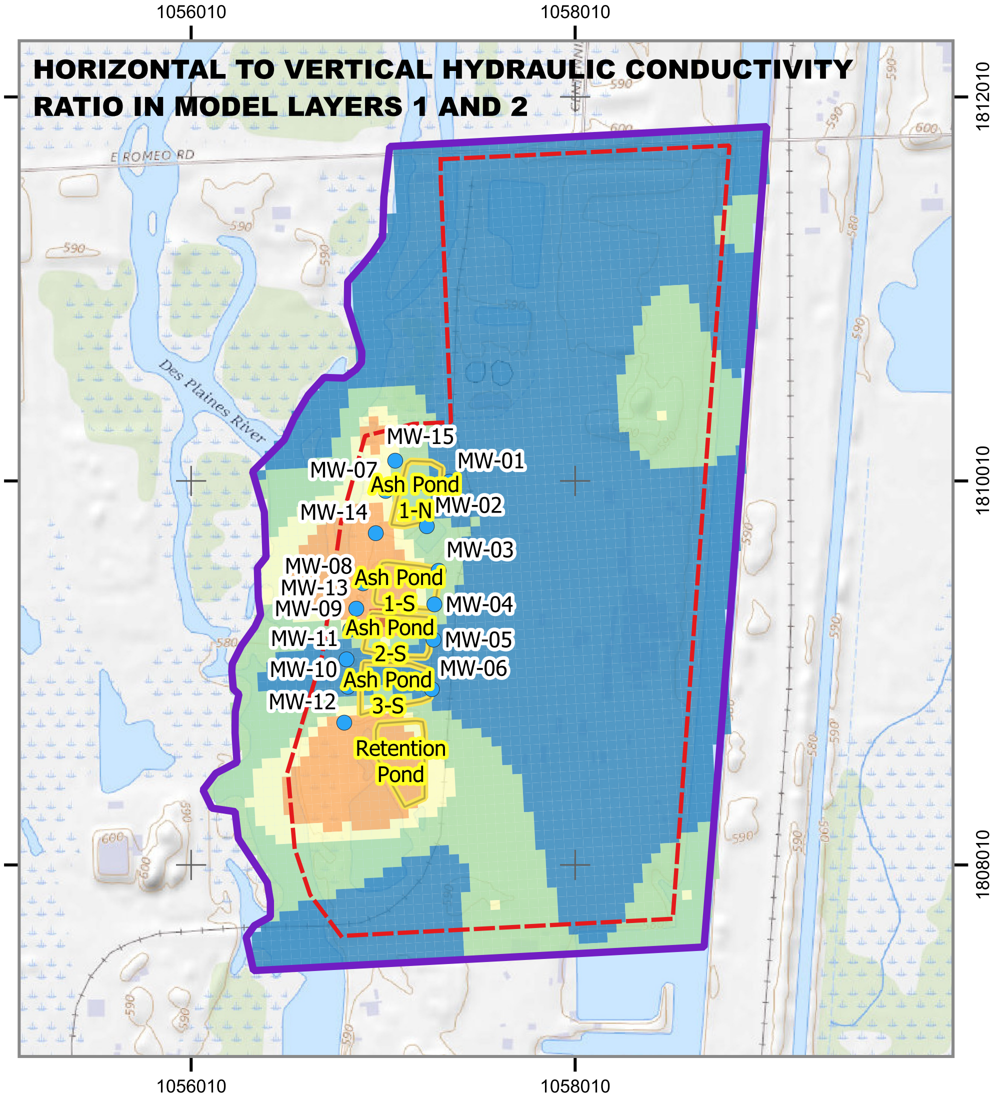
KPRG

CLIENT	MIDWEST GENERATION
SITE	WILL COUNTY 529 OLD ROMEO RD, ROMEOVILLE, IL
TITLE	**MODEL LAYERING**

SCALE AT ANSI A	DRAWN	DZF	01/11/2023
	CHECKED	BAS	01/11/2023
BAS PROJECT No.	21141501	FIGURE:	**10**



HORIZONTAL HYDRAULIC CONDUCTIVITY IN MODEL LAYERS 1 AND 2



HORIZONTAL TO VERTICAL HYDRAULIC CONDUCTIVITY RATIO IN MODEL LAYERS 1 AND 2

LEGEND

MODEL BOUNDARY

APPROXIMATE SITE BOUNDARY

● SITE MONITORING WELL

CALIBRATED HORIZONTAL HYDRAULIC CONDUCTIVITY VALUES, FT/D

- 0.08 - 0.74
- 0.74 - 1.75
- 1.75 - 3.04
- 3.04 - 4.58
- 4.58 - 6.76
- 6.76 - 9.78
- 9.78 - 13.27
- 13.27 - 16.91
- 16.91 - 21.85
- 21.85 - 25

HORIZONTAL TO VERTICAL HYDRAULIC CONDUCTIVITY RATIO

- 1 - 10
- 10 - 50
- 50 - 100
- 100 - 500
- 500 - 1000

BAS GROUNDWATER CONSULTING

KPRG

0 600 1,200 ft

FEET

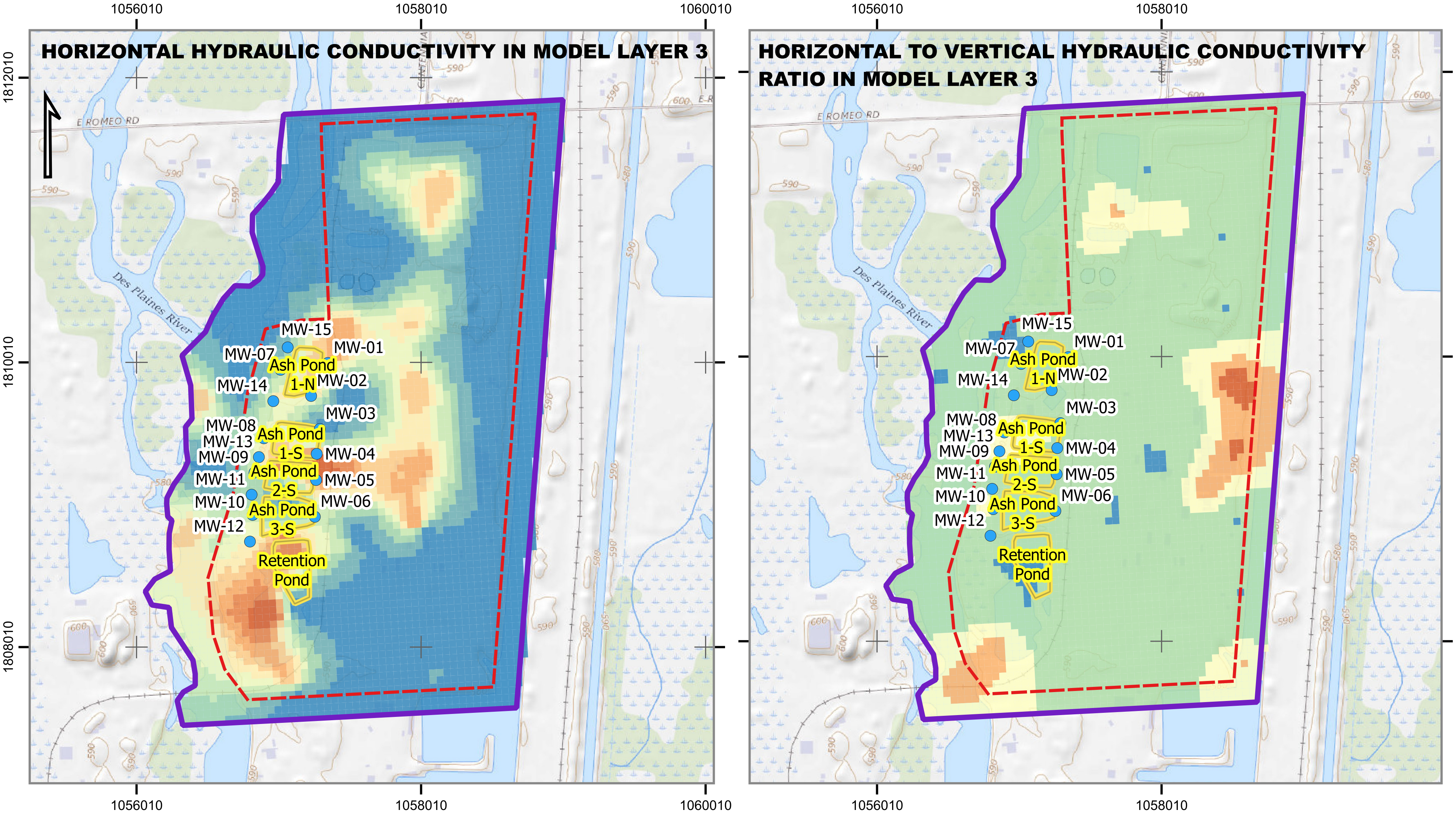
Coordinate System:
NAD_1983_StatePlane_Illinois_East_FIPS_1201_Feet
Project File: Figure11a_CalibratedKsLayers1_2.qgz

CLIENT
MIDWEST GENERATION

SITE
WILL COUNTY
529 OLD ROMEO RD, ROMEOVILLE, IL

TITLE
CALIBRATED HYDRAULIC CONDUCTIVITY DISTRIBUTION IN MODEL LAYERS 1 & 2

SCALE AT ANSI A	DRAWN	DZF	03/29/2023
1:12,000	CHECKED	BAS	03/29/2023
BAS PROJECT No.		FIGURE:	
21141501		**11a**	



LEGEND

▭ MODEL BOUNDARY

● SITE MONITORING WELL

▭ APPROXIMATE SITE BOUNDARY

CALIBRATED HORIZONTAL HYDRAULIC CONDUCTIVITY VALUES, FT/D

🟦	0.8 - 2.4	🟨	16.2 - 21.5
🟦	2.4 - 5.1	🟧	21.5 - 26.8
🟩	5.1 - 8.3	🟧	26.8 - 31.1
🟩	8.3 - 12	🟥	31.1 - 36.6
🟨	12 - 16.2	🟥	36.6 - 40

HORIZONTAL TO VERTICAL HYDRAULIC CONDUCTIVITY RATIO

🟦	0.1 - 1.0
🟩	1.0 - 3.0
🟨	3.0 - 5.0
🟧	5.0 - 7.0
🟥	7.0 - 10.0

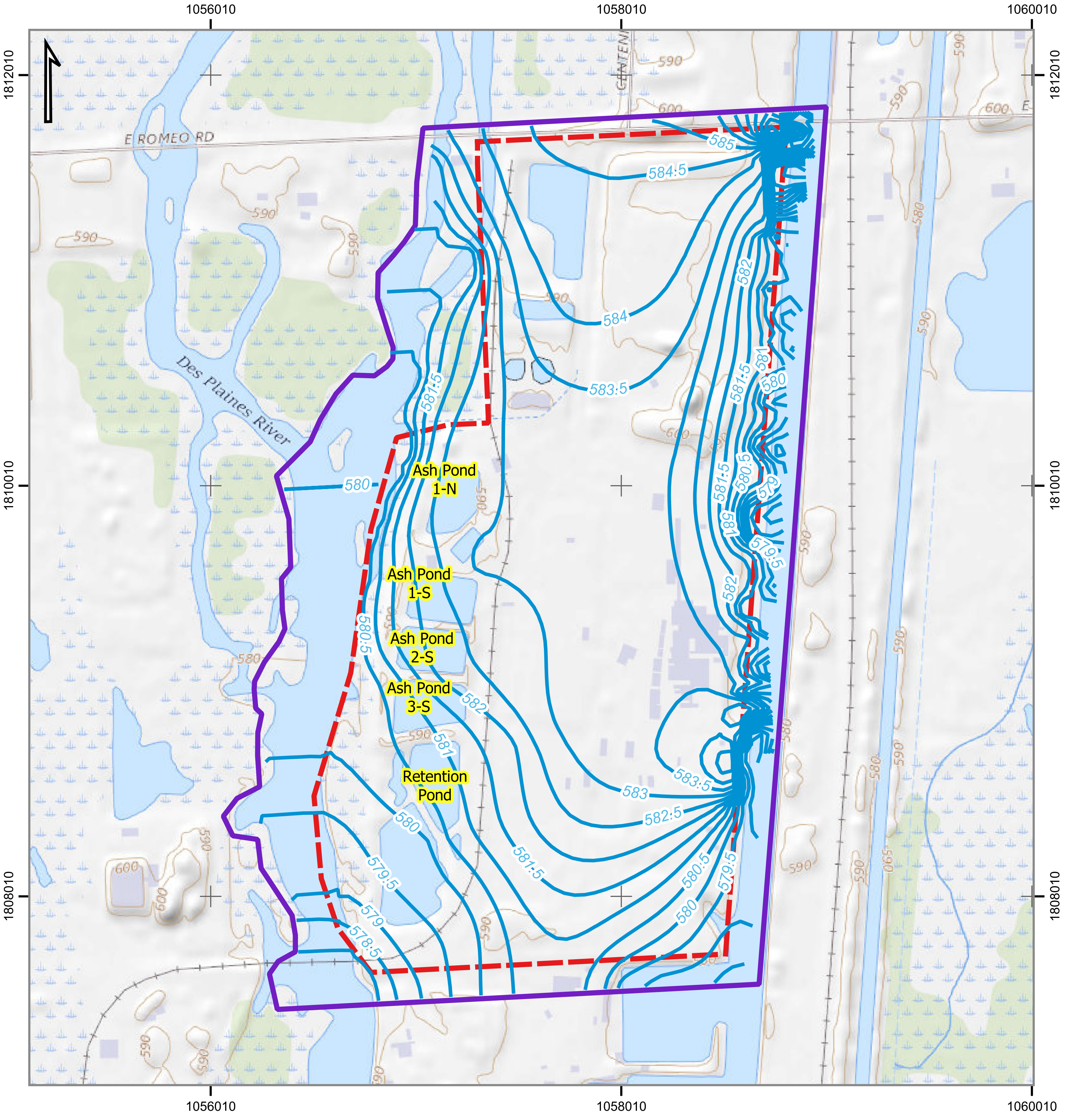
BAS GROUNDWATER CONSULTING

KPRG

0 600 1,200 ft
FEET

Coordinate System:
NAD_1983_StatePlane_Illinois_East_FIPS_1201_Feet
Project File: Figure11b_CalibratedKsLayers3_4.qgz

CLIENT	MIDWEST GENERATION		
SITE	WILL COUNTY 529 OLD ROMEO RD, ROMEOVILLE, IL		
TITLE	**CALIBRATED HYDRAULIC CONDUCTIVITY DISTRIBUTION IN MODEL LAYERS 3 & 4**		
SCALE AT ANSI A 1:12,000	DRAWN	DZF	03/29/2023
	CHECKED	BAS	03/29/2023
BAS PROJECT No. 21141501	FIGURE: **11b**		



LEGEND

- MODELED WATER LEVEL ELEVATION CONTOUR (FT, AMSL)
- APPROXIMATE SITE BOUNDARY

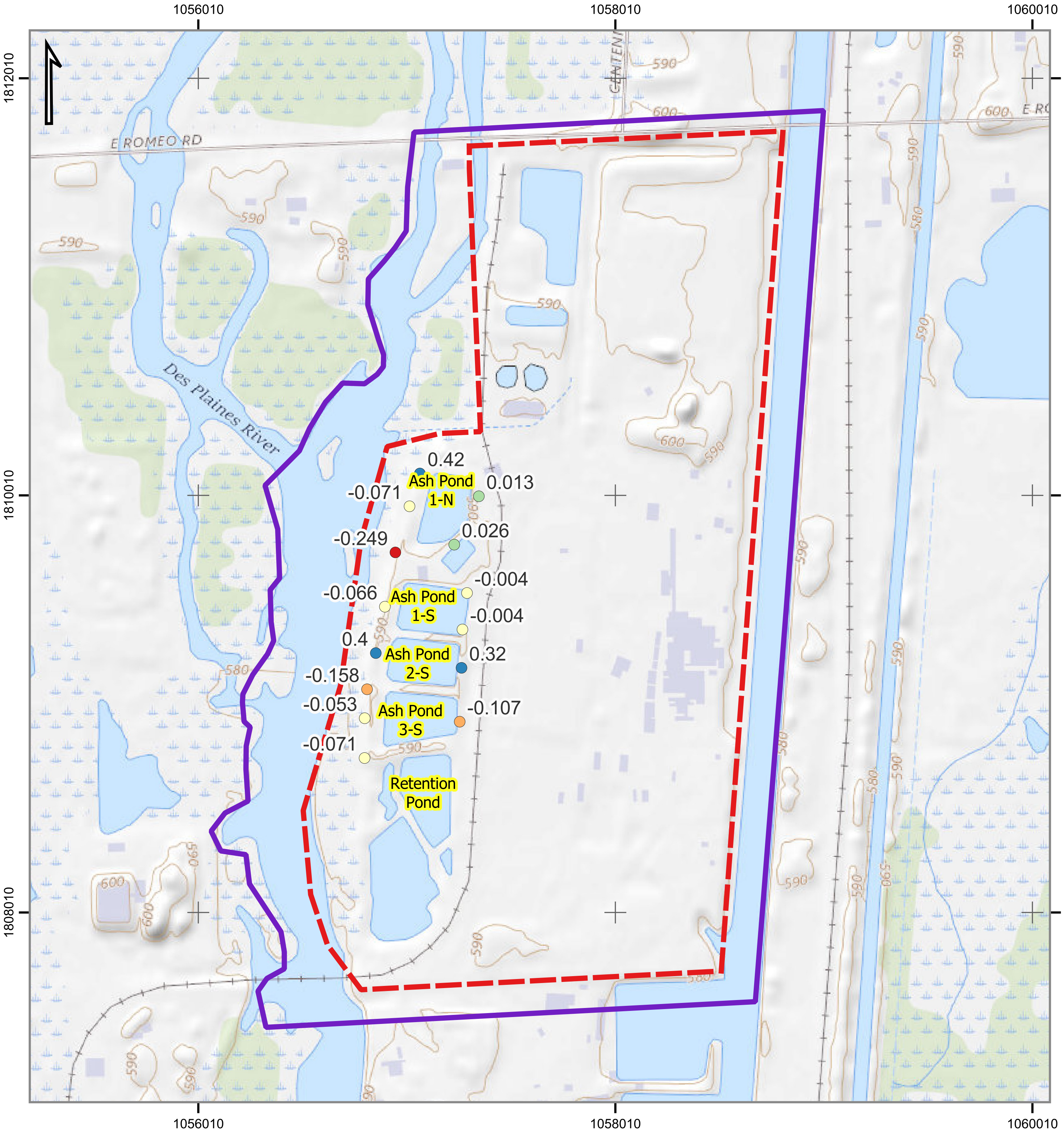
0 400 800 ft
FEET

Coordinate System: NAD_1983_StatePlane_Illinois_East_FIPS_1201_Feet
Project File: Figure12_CalibratedWLs.qgz

BAS GROUNDWATER CONSULTING
KPRG

CLIENT	MIDWEST GENERATION
SITE	WILL COUNTY 529 OLD ROMEO RD, ROMEOVILLE, IL
TITLE	**CALIBRATED WATER LEVEL ELEVATIONS IN CARBONATES**

SCALE AT ANSI A 1:8,000	DRAWN	DZF	04/05/2023
	CHECKED	BAS	04/05/2023
BAS PROJECT No. 21141501	FIGURE: **12**		



LEGEND

▭ MODEL BOUNDARY

▭ APPROXIMATE SITE BOUNDARY

RESIDUALS (FT.)

● -0.3 - -0.2

● -0.2 - -0.1

○ -0.1 - 0

● 0 - 0.1

● 0.1 - 0.5

0 400 800 ft

FEET

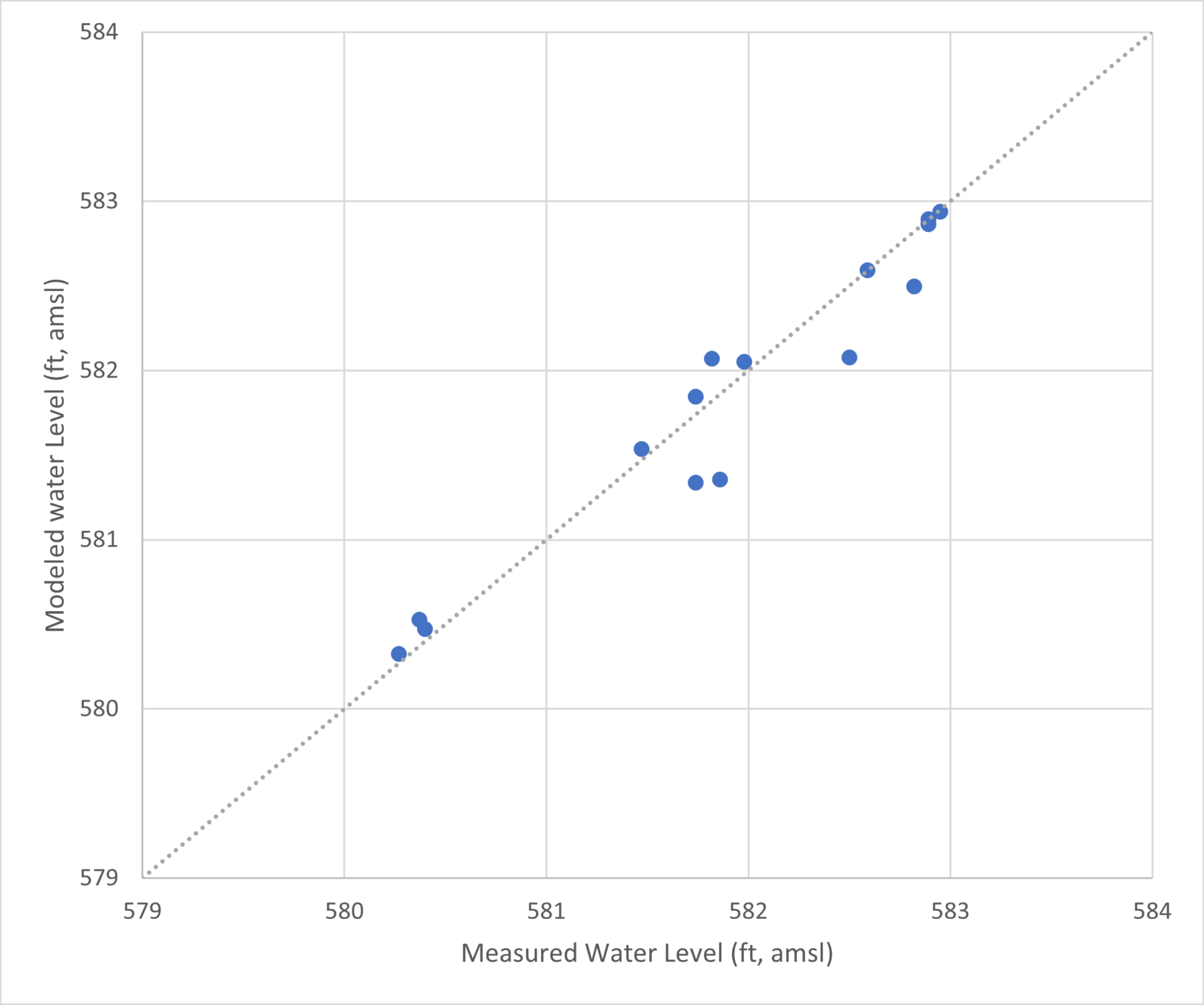
Coordinate System:
NAD_1983_StatePlane_Illinois_East_FIPS_1201_Feet
Project File: Figure13_CalibratedResiduals.qgz

BAS GROUNDWATER CONSULTING

KPRG

CLIENT	MIDWEST GENERATION
SITE	WILL COUNTY 529 OLD ROMEO RD, ROMEOVILLE, IL
TITLE	**CALIBRATED WATER LEVEL RESIDUALS**

SCALE AT ANSI A 1:8,000	DRAWN	DZF	05/09/2023
	CHECKED	BAS	05/09/2023
BAS PROJECT No. 21141501		FIGURE: **13**	



BAS GROUNDWATER CONSULTING

K P R G

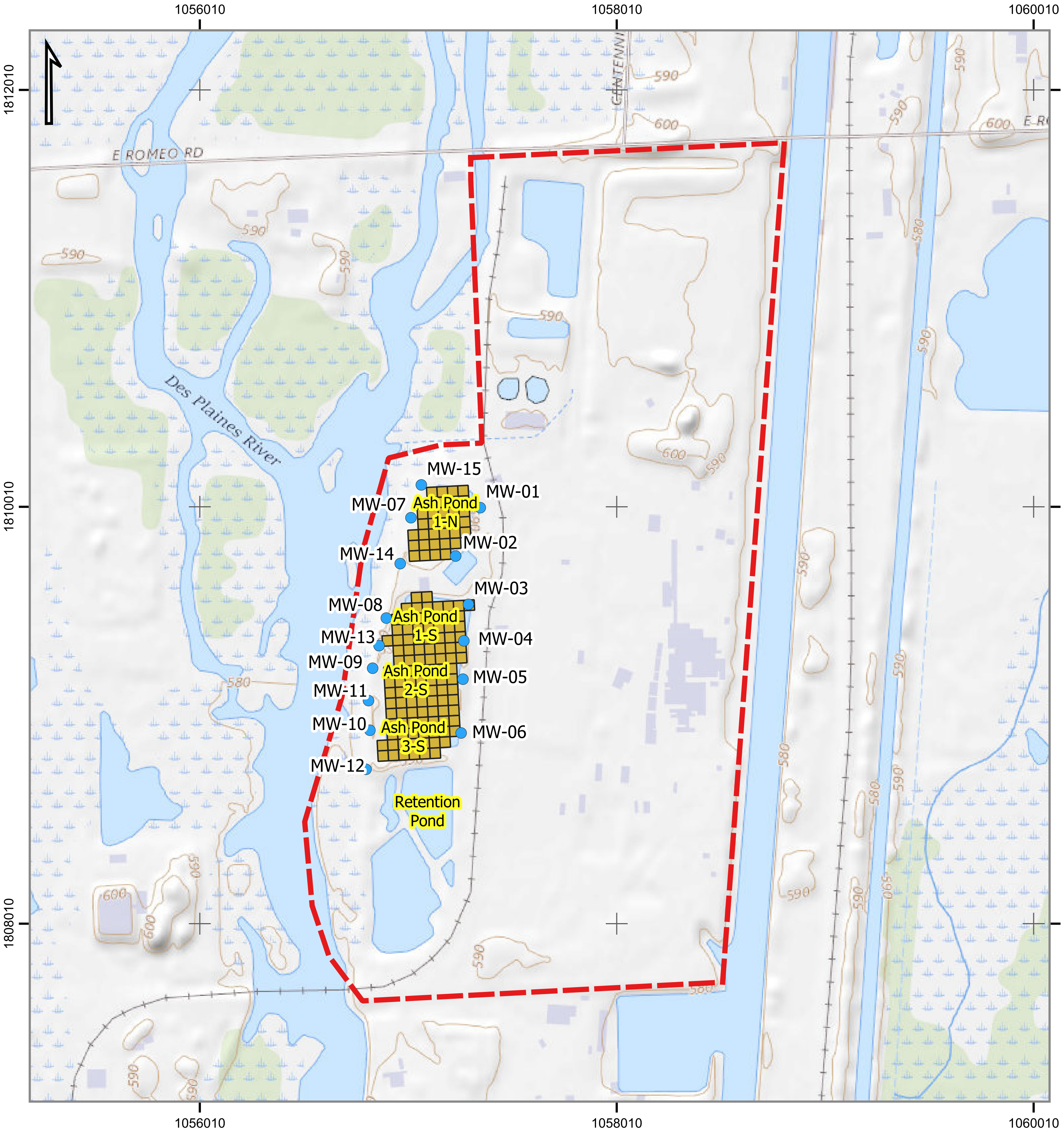
SCALE AT ANSI A	DRAWN	DZF	04/05/2023
	CHECKED	BAS	04/05/2023
BAS PROJECT No. 21141501		FIGURE: **14**	

CLIENT
MIDWEST GENERATION

SITE
WILL COUNTY
529 OLD ROMEO RD, ROMEOVILLE, IL

TITLE
CALIBRATION SCATTER PLOT

Project File: Figure14_CalibrationScatterPlot.qgz



LEGEND

- ● SITE MONITORING WELL
- ▭ APPROXIMATE SITE BOUNDARY
- ■ SOURCE AREAS FOR INITIAL SURROGATE SIMULATION

0 400 800 ft

FEET

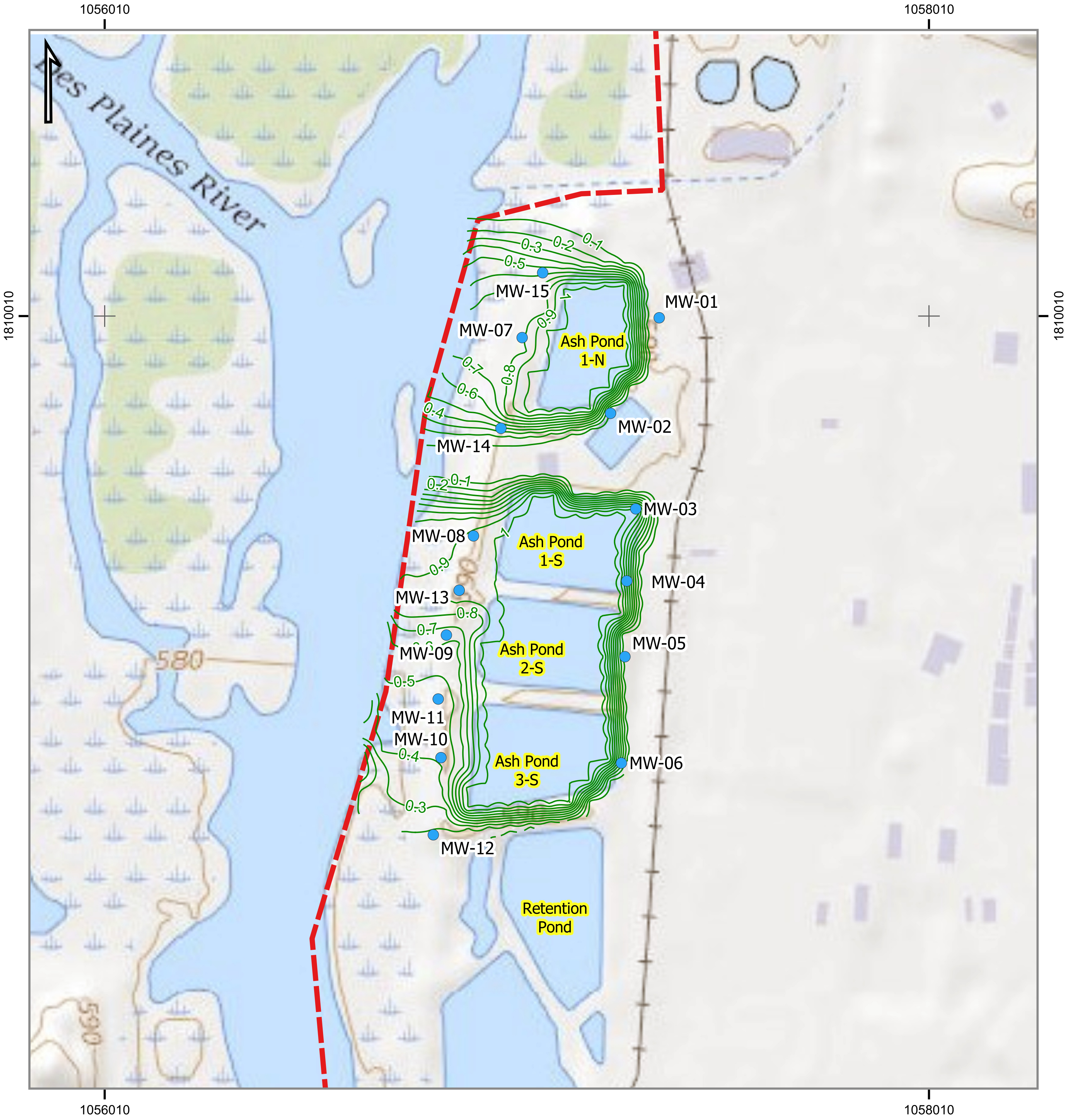
Coordinate System:
NAD_1983_StatePlane_Illinois_East_FIPS_1201_Feet
Project File: Figure15_SourceAreas_SurrogateSimulations.qgz

BAS GROUNDWATER CONSULTING

K P R G

CLIENT	MIDWEST GENERATION
SITE	WILL COUNTY 529 OLD ROMEO RD, ROMEOVILLE, IL
TITLE	**SOURCE AREAS FOR INITIAL SURROGATE SIMULATION**

SCALE AT ANSI A 1:8,000	DRAWN	DZF	04/05/2023
	CHECKED	BAS	04/05/2023
BAS PROJECT No. 21141501	FIGURE: **15**		



LEGEND

● SITE MONITORING WELL

▭ APPROXIMATE SITE BOUNDARY

— 100-YEAR RELATIVE SURROGATE CONCENTRATIONS

Maximum relative concentrations above competent bedrock

0 200 400 ft
FEET

Coordinate System:
NAD_1983_StatePlane_Illinois_East_FIPS_1201_Feet
Project File: Figure16_SurrogateSimulations.qgz

BAS GROUNDWATER CONSULTING
KPRG

CLIENT
MIDWEST
GENERATION

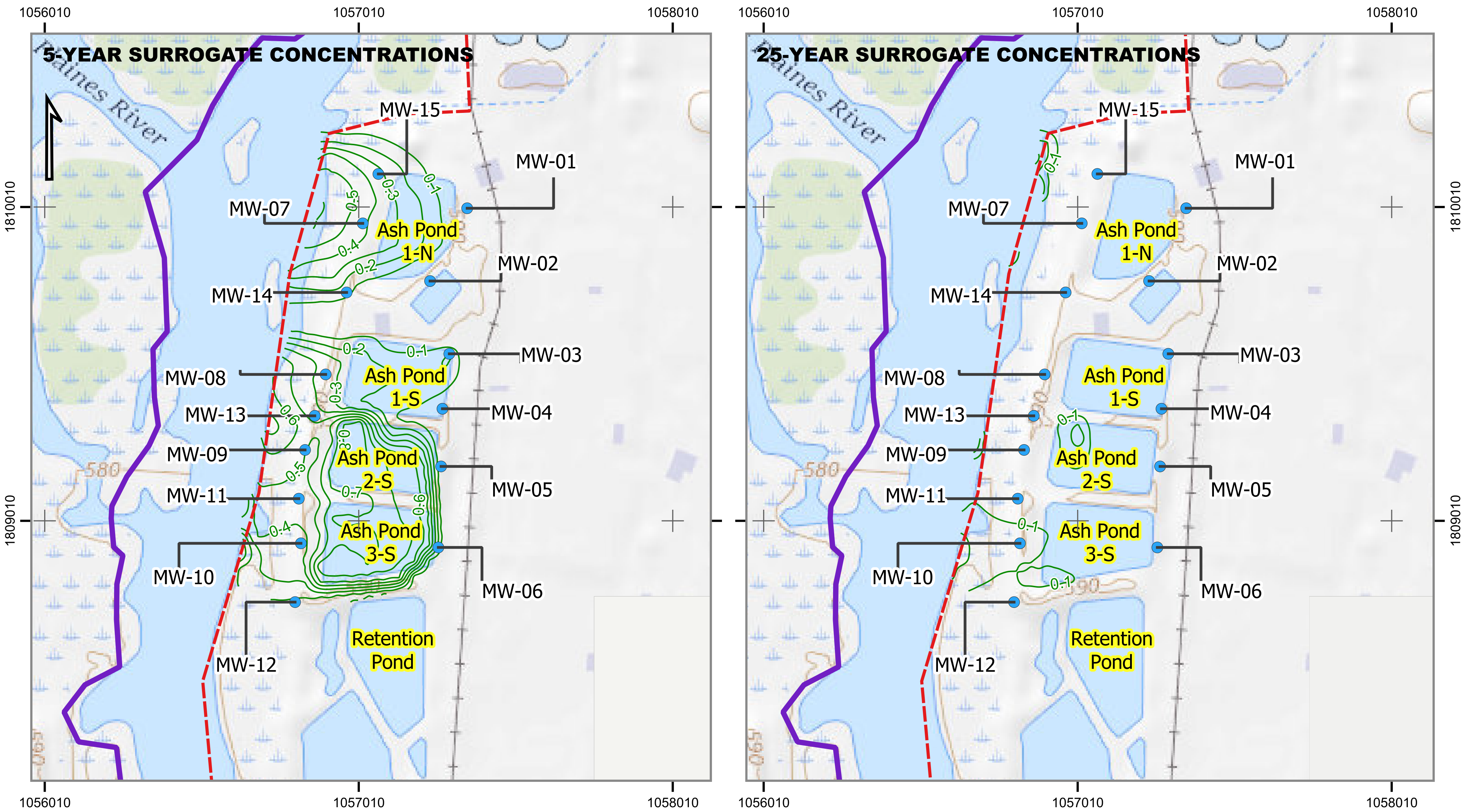
SITE
WILL COUNTY
529 OLD ROMEO RD, ROMEOVILLE, IL

TITLE
100-YEAR RELATIVE SURROGATE CONCENTRATIONS

SCALE AT ANSI A 1:4,000	*DRAWN*	*DZF*	04/21/2023
	CHECKED	*BAS*	04/21/2023

BAS PROJECT No. 21141501

FIGURE: **16**



LEGEND

● SITE MONITORING WELL

▭ MODEL BOUNDARY

▭ APPROXIMATE SITE BOUNDARY

— RELATIVE SURROGATE CONCENTRATIONS

Maximum relative concentrations above competent bedrock

0 200 400 ft
FEET

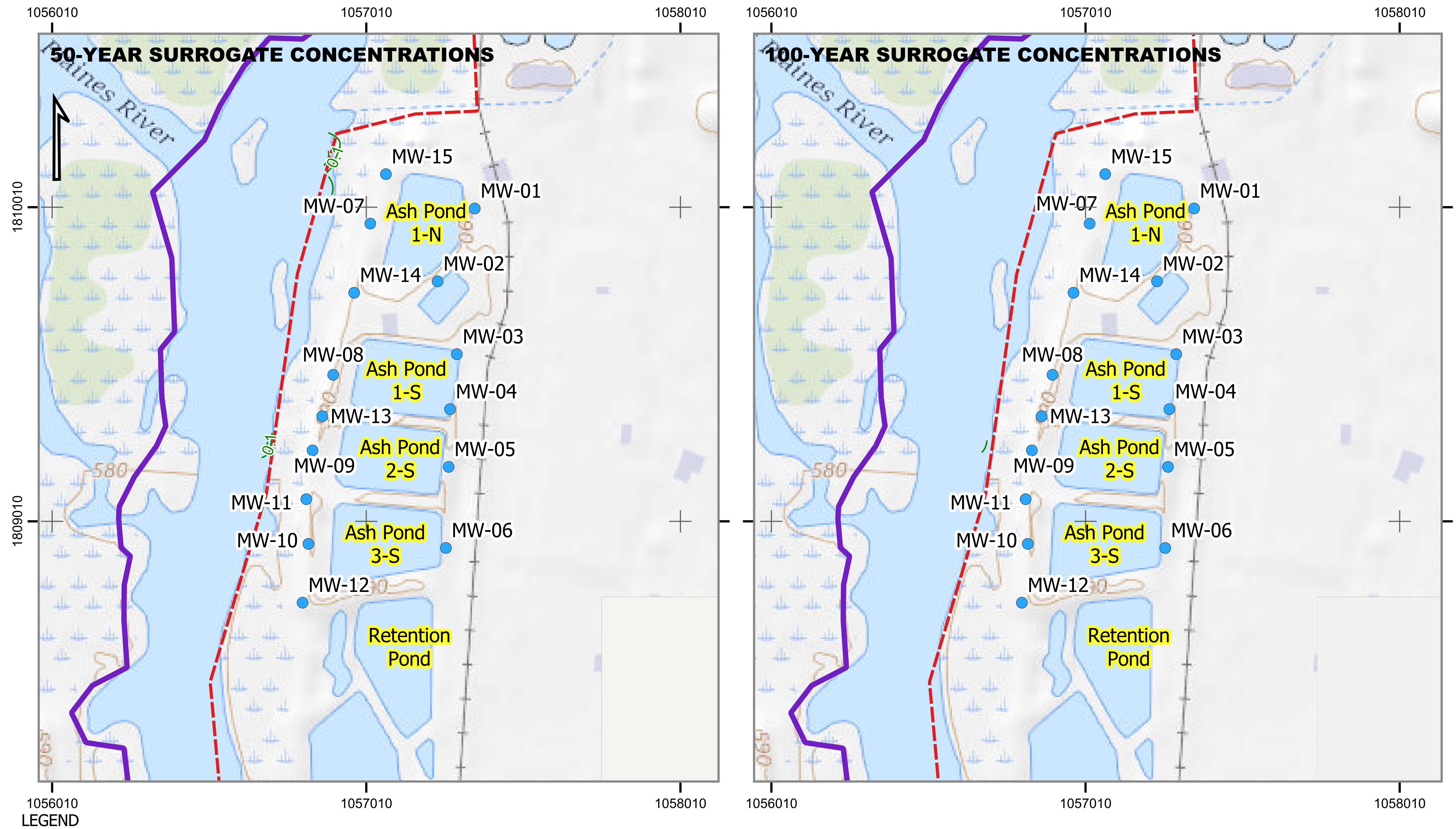
Coordinate System:
NAD_1983_StatePlane_Illinois_East_FIPS_1201_Feet
Project File:
Figure17_RelativeSurrogateConcentrations_5_25_Years_Scenario1.qgz

BAS GROUNDWATER CONSULTING

KPRG

CLIENT	MIDWEST GENERATION
SITE	WILL COUNTY 529 OLD ROMEO RD, ROMEOVILLE, IL
TITLE	**RELATIVE SURROGATE CONCENTRATIONS AT 5 AND 25 YEARS, SCENARIO 1**

SCALE AT ANSI A 1:5,400	DRAWN	DZF	04/21/2023
	CHECKED	BAS	04/21/2023
BAS PROJECT No. 21141501		FIGURE: **17**	



LEGEND

- ● SITE MONITORING WELL
- ▭ MODEL BOUNDARY
- ⬚ APPROXIMATE SITE BOUNDARY
- — RELATIVE SURROGATE CONCENTRATIONS

Maximum relative concentrations above competent bedrock

BAS GROUNDWATER CONSULTING

K P R G

0 200 400 ft

FEET

Coordinate System:
NAD_1983_StatePlane_Illinois_East_FIPS_1201_Feet
Project File:
Figure18_RelativeSurrogateConcentrations_50_100_Years_Scenario1.qgz

CLIENT
MIDWEST GENERATION

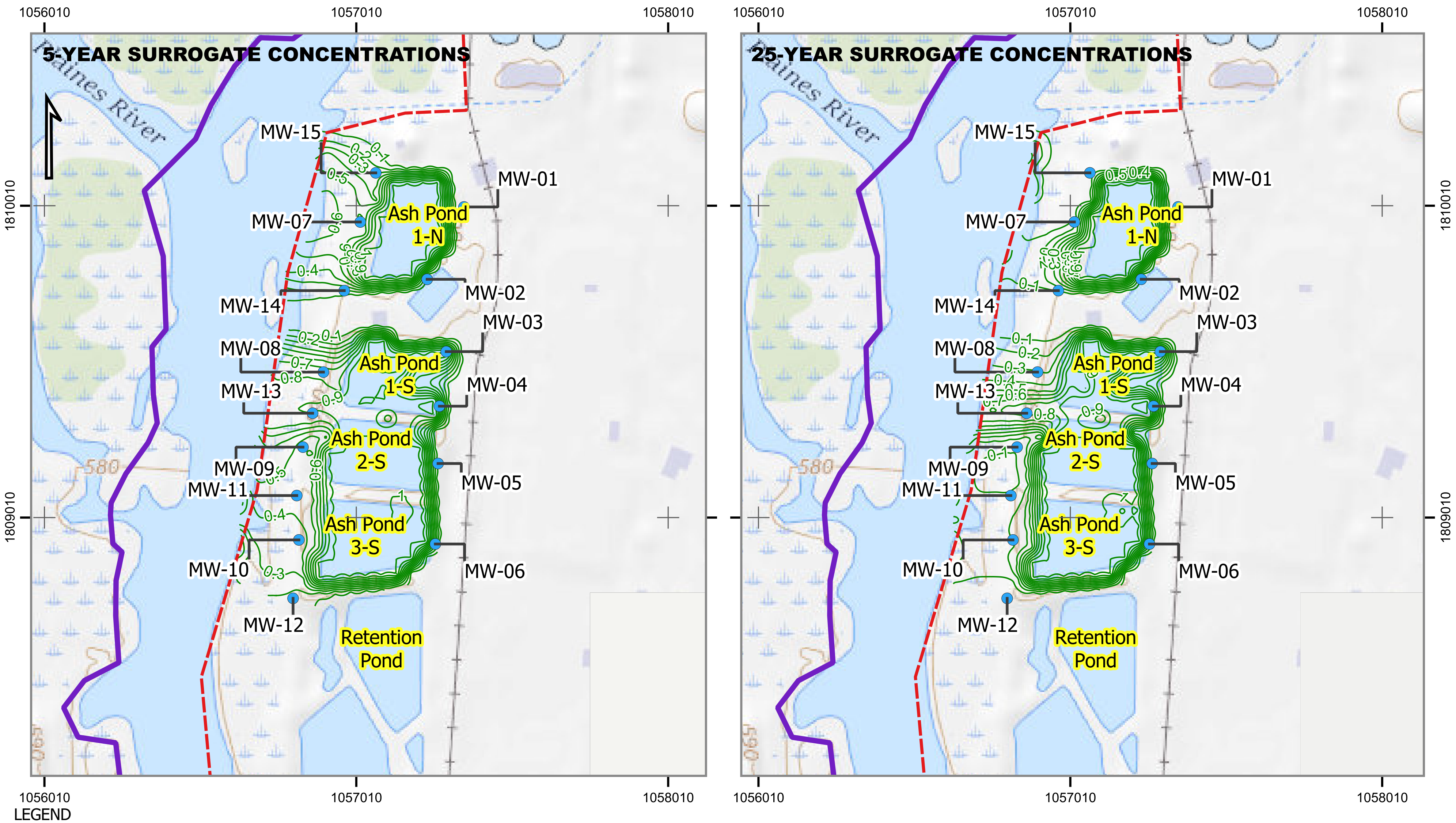
SITE
WILL COUNTY
529 OLD ROMEO RD, ROMEOVILLE, IL

TITLE
RELATIVE SURROGATE CONCENTRATIONS AT 50 AND 100 YEARS, SCENARIO 1

SCALE AT ANSI A 1:5,400	DRAWN	DZF	04/21/2023
	CHECKED	BAS	04/21/2023

BAS PROJECT No.
21141501

FIGURE:
18



LEGEND

● SITE MONITORING WELL

▭ MODEL BOUNDARY

▭ APPROXIMATE SITE BOUNDARY

— RELATIVE SURROGATE CONCENTRATIONS

Maximum relative concentrations above competent bedrock

BAS GROUNDWATER CONSULTING

K P R G

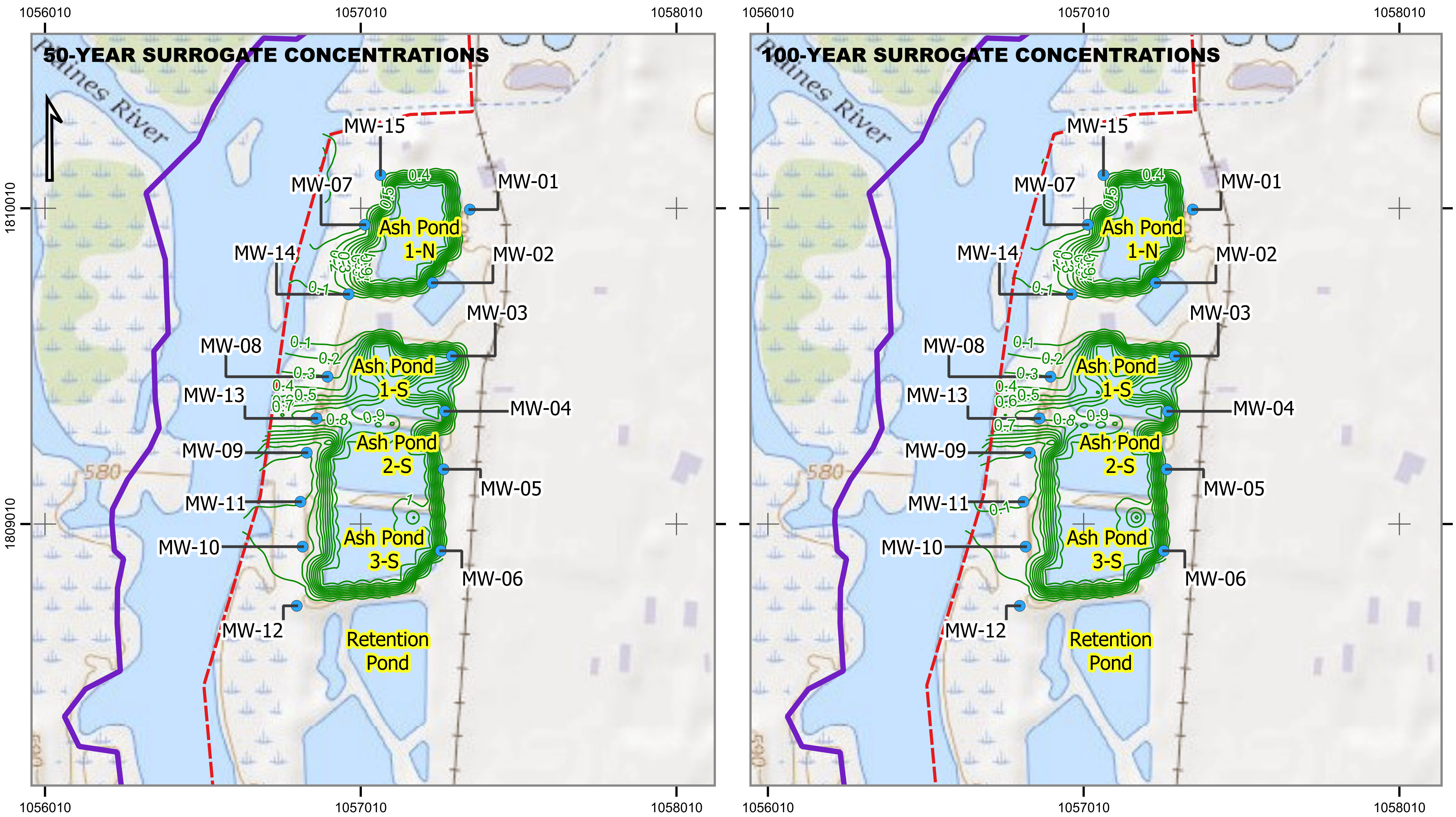
0 200 400 ft

FEET

Coordinate System:
NAD_1983_StatePlane_Illinois_East_FIPS_1201_Feet
Project File:
Figure19_RelativeSurrogateConcentrations_5_25_Years_Scenario2.qgz

CLIENT	MIDWEST GENERATION
SITE	WILL COUNTY 529 OLD ROMEO RD, ROMEOVILLE, IL
TITLE	**RELATIVE SURROGATE CONCENTRATIONS AT 5 AND 25 YEARS, SCENARIO 2**

SCALE AT ANSI A 1:5,400	DRAWN	DZF	04/21/2023
	CHECKED	BAS	04/21/2023
BAS PROJECT No. 21141501		FIGURE: **19**	



LEGEND

● SITE MONITORING WELL

▭ MODEL BOUNDARY

▭ APPROXIMATE SITE BOUNDARY

— RELATIVE SURROGATE CONCENTRATIONS

Maximum relative concentrations above competent bedrock

BAS GROUNDWATER CONSULTING

K P R G

0 200 400 ft

FEET

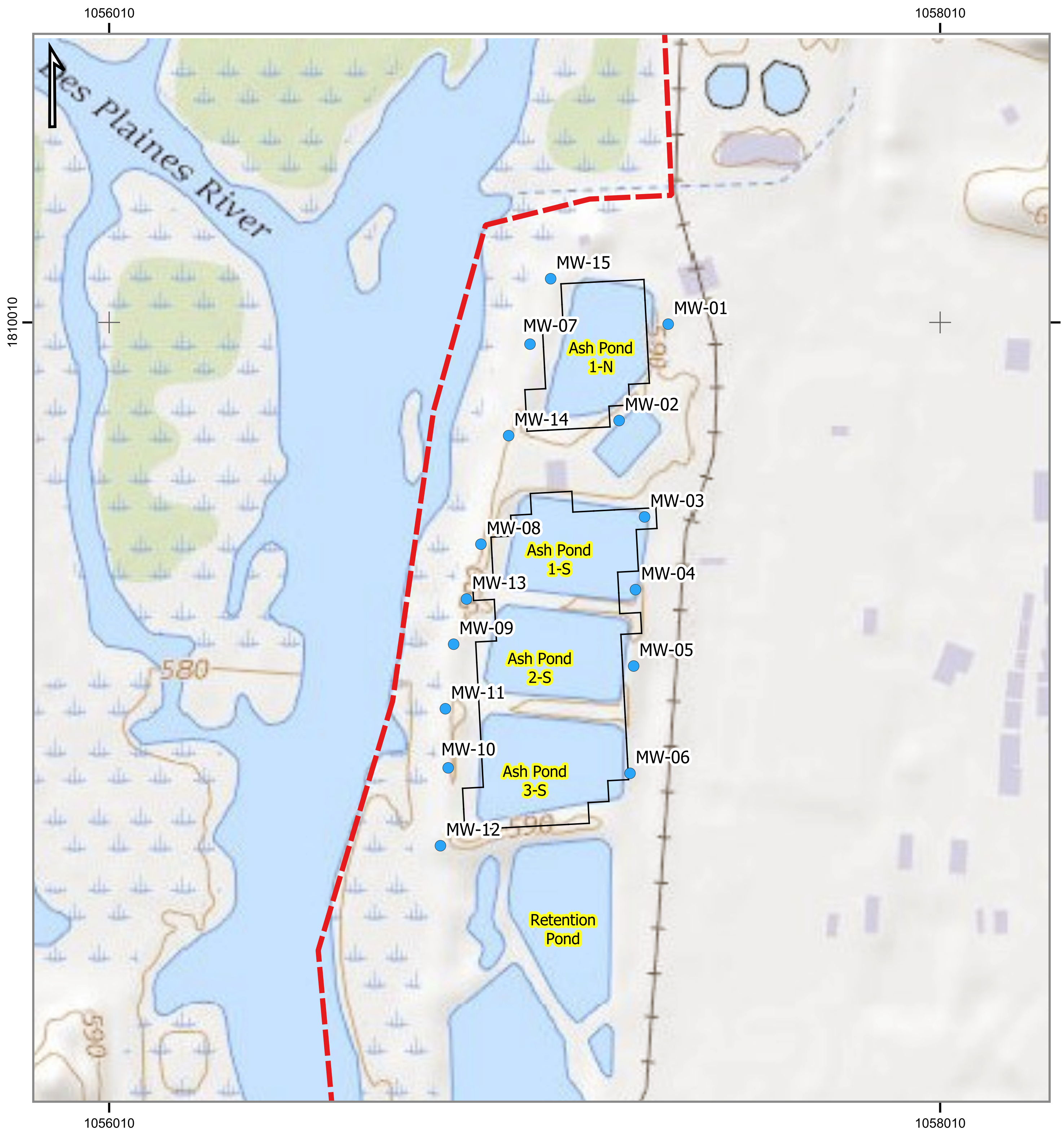
Coordinate System:
NAD_1983_StatePlane_Illinois_East_FIPS_1201_Feet
Project File:
Figure20_RelativeSurrogateConcentrations_50_100_Years_Scenario2.qgz

CLIENT
MIDWEST
GENERATION

SITE
WILL COUNTY
529 OLD ROMEO RD, ROMEOVILLE, IL

TITLE
RELATIVE SURROGATE CONCENTRATIONS AT 50 AND 100 YEARS, SCENARIO 2

SCALE AT ANSI A 1:5,400	DRAWN	DZF	04/21/2023
	CHECKED	BAS	04/21/2023
BAS PROJECT No. 21141501		FIGURE: **20**	



LEGEND

● SITE MONITORING WELL

🟥 APPROXIMATE SITE BOUNDARY

— AREA OF BARRIER WALL

0 200 400 ft

FEET

Coordinate System:
NAD_1983_StatePlane_Illinois_East_FIPS_1201_Feet
Project File: Figure21_AreaOfBarrierWallForClosureAlt3.qgz

BAS GROUNDWATER CONSULTING

KPRG

CLIENT
MIDWEST
GENERATION

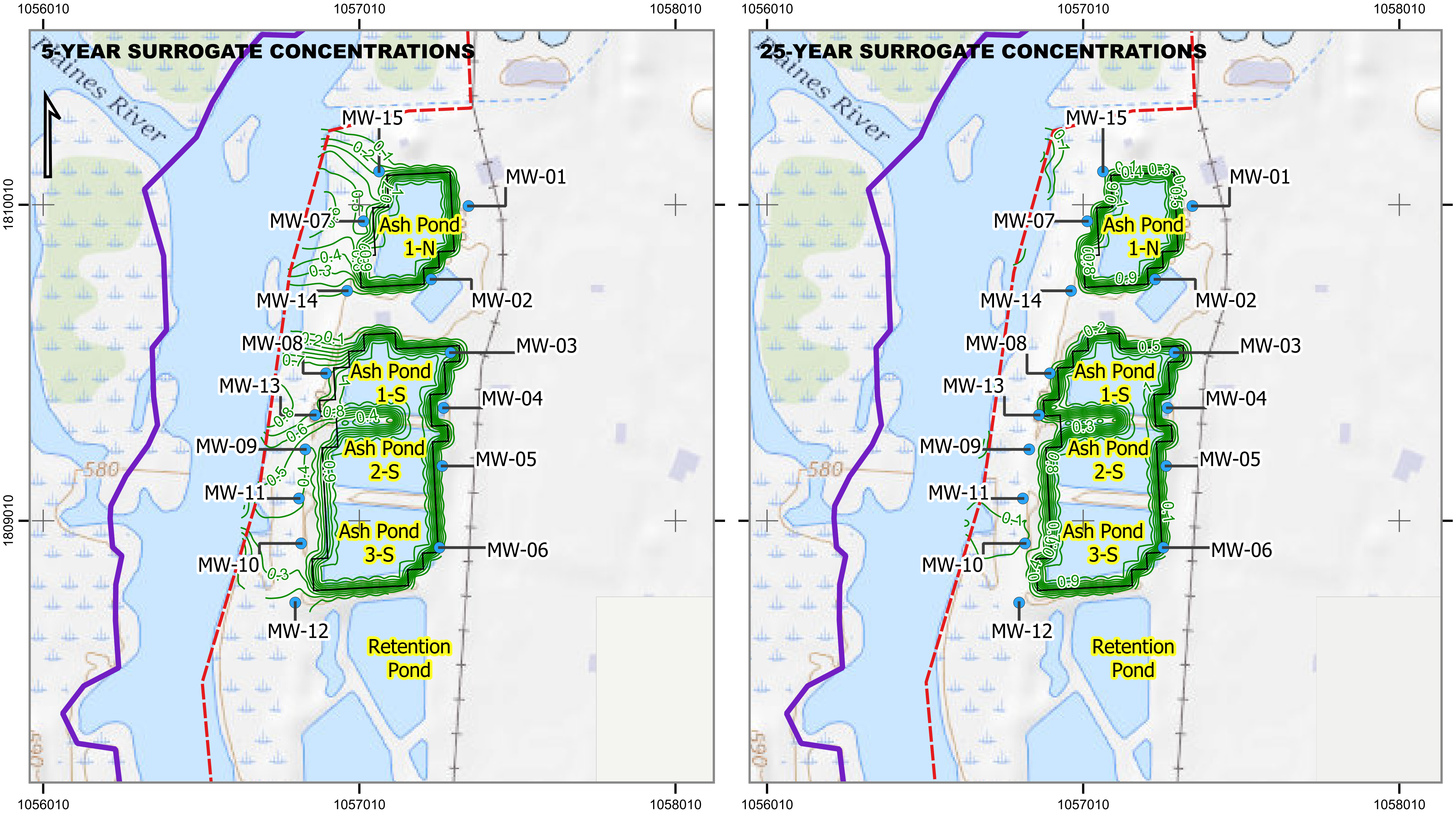
SITE
WILL COUNTY
529 OLD ROMEO RD, ROMEOVILLE, IL

TITLE
AREA OF BARRIER WALL FOR CLOSURE ALTERNATIVE 3

SCALE AT ANSI A 1:4,000	DRAWN	DZF	04/05/2023
	CHECKED	BAS	04/05/2023

BAS PROJECT No.
21141501

FIGURE:
21



LEGEND

● SITE MONITORING WELL

▭ MODEL BOUNDARY

▭ APPROXIMATE SITE BOUNDARY

— AREA OF BARRIER WALL

— RELATIVE SURROGATE CONCENTRATIONS

Maximum relative concentrations above competent bedrock

BAS GROUNDWATER CONSULTING

K P R G

0 200 400 ft

FEET

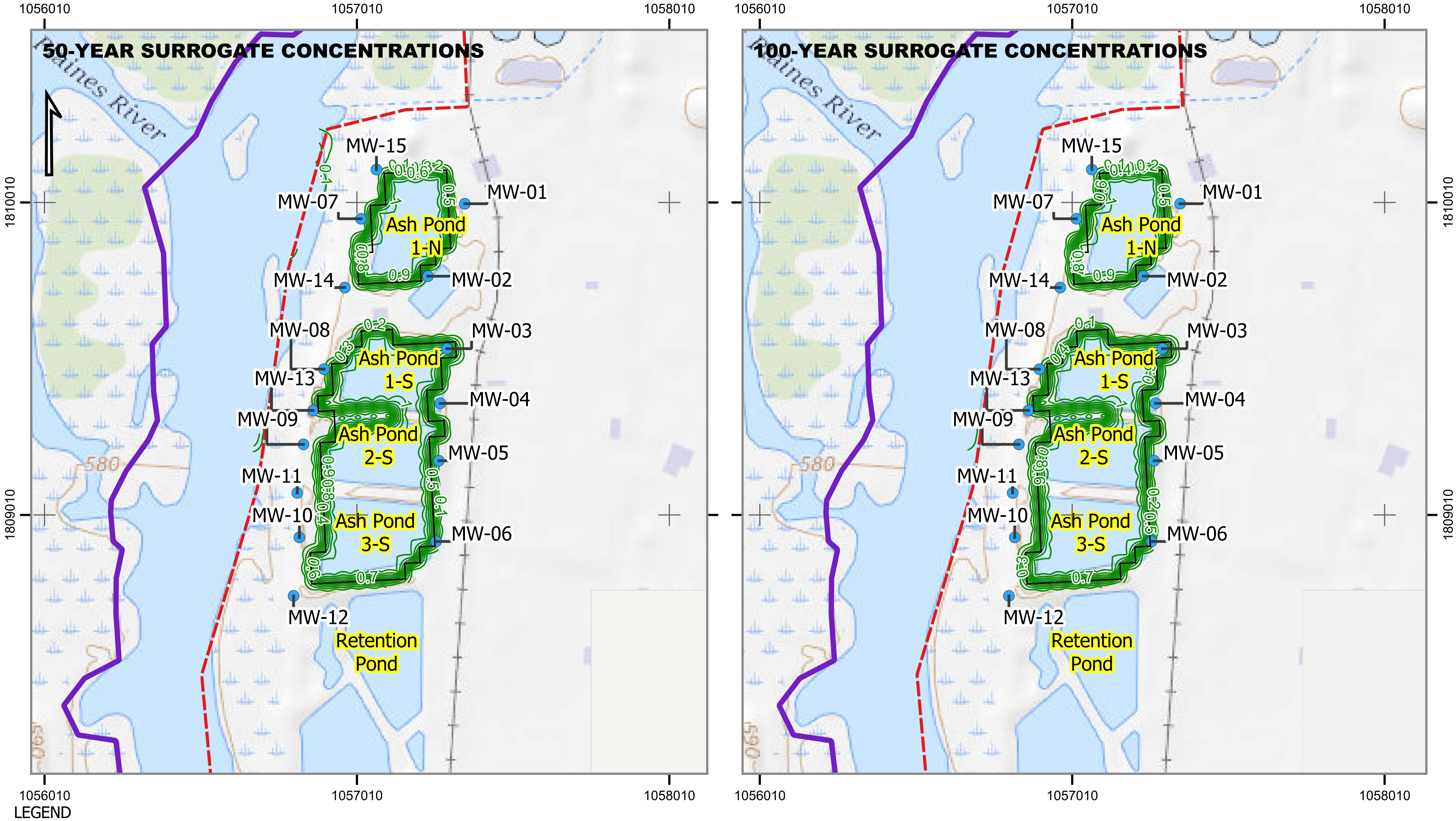
Coordinate System:
NAD_1983_StatePlane_Illinois_East_FIPS_1201_Feet
Project File:
Figure22_RelativeSurrogateConcentrations_5_25_Years_Scenario3.qgz

CLIENT
MIDWEST GENERATION

SITE
WILL COUNTY
529 OLD ROMEO RD, ROMEOVILLE, IL

TITLE
RELATIVE SURROGATE CONCENTRATIONS AT 5 AND 25 YEARS, SCENARIO 3

SCALE AT ANSI A 1:5,400	DRAWN	DZF	04/21/2023
	CHECKED	BAS	04/21/2023
BAS PROJECT No. 21141501	FIGURE: **22**		



LEGEND

● SITE MONITORING WELL

▭ MODEL BOUNDARY

▭ APPROXIMATE SITE BOUNDARY

— AREA OF BARRIER WALL

— RELATIVE SURROGATE CONCENTRATIONS

Maximum relative concentrations above competent bedrock

BAS GROUNDWATER CONSULTING

K P R G

0 200 400 ft
FEET

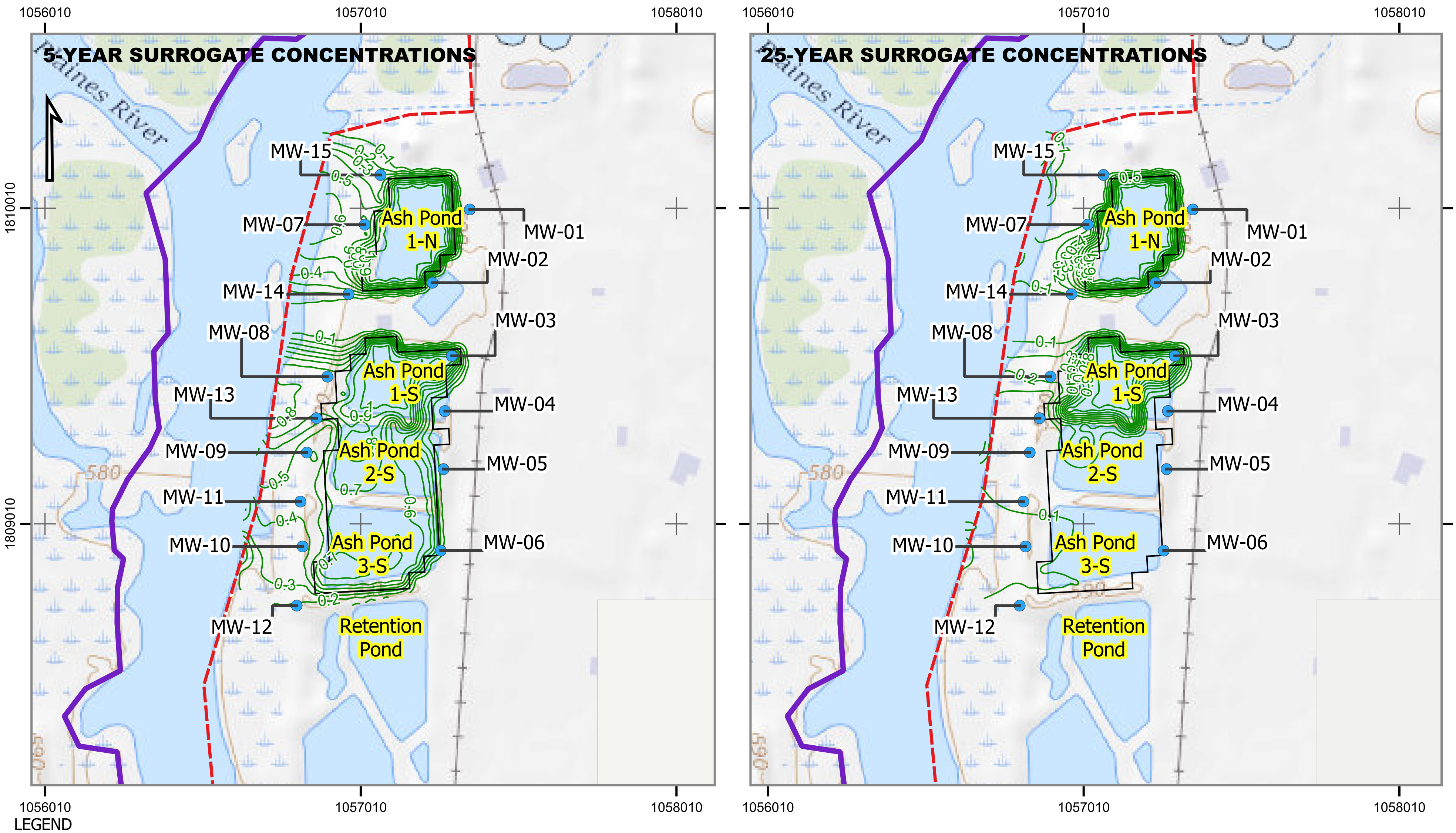
Coordinate System:
NAD_1983_StatePlane_Illinois_East_FIPS_1201_Feet
Project File:
Figure23_RelativeSurrogateConcentrations_50_100_Years_Scenario3.qgz

CLIENT
MIDWEST GENERATION

SITE
WILL COUNTY
529 OLD ROMEO RD, ROMEOVILLE, IL

TITLE
RELATIVE SURROGATE CONCENTRATIONS AT 50 AND 100 YEARS, SCENARIO 3

SCALE AT ANSI A 1:5,400	DRAWN	DZF	04/21/2023
	CHECKED	BAS	04/21/2023
BAS PROJECT No. 21141501		FIGURE: **23**	



LEGEND

● SITE MONITORING WELL

▭ MODEL BOUNDARY

▭ APPROXIMATE SITE BOUNDARY

— AREA OF BARRIER WALL

— RELATIVE SURROGATE CONCENTRATIONS

Maximum relative concentrations above competent bedrock

BAS GROUNDWATER CONSULTING

KPRG

0 200 400 ft
FEET

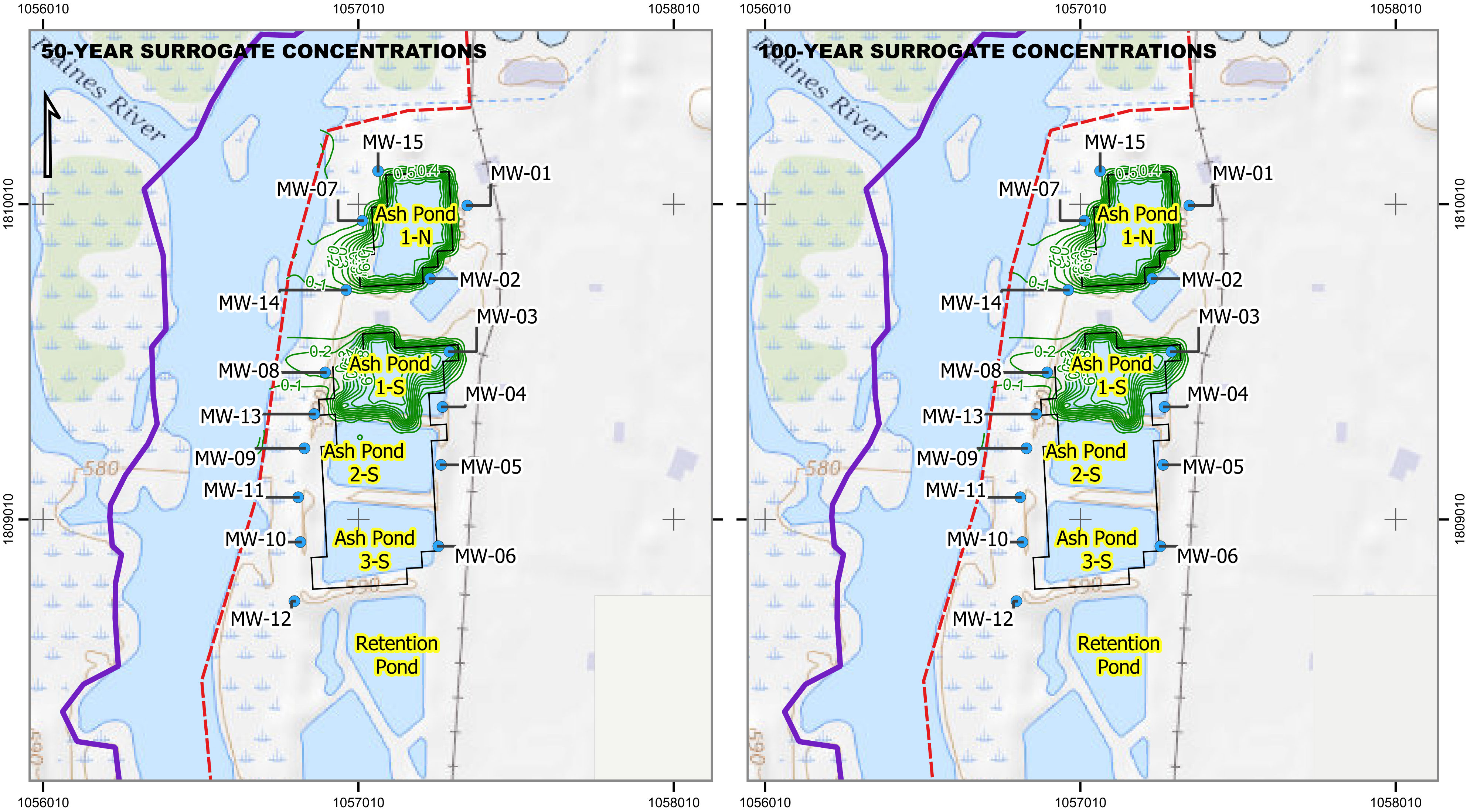
Coordinate System:
NAD_1983_StatePlane_Illinois_East_FIPS_1201_Feet
Project File:
Figure24_RelativeSurrogateConcentrations_5_25_Years_Scenario4.qgz

CLIENT
MIDWEST GENERATION

SITE
WILL COUNTY
529 OLD ROMEO RD, ROMEOVILLE, IL

TITLE
RELATIVE SURROGATE CONCENTRATIONS AT 5 AND 25 YEARS, SCENARIO 4

SCALE AT ANSI A 1:5,400	DRAWN	DZF	05/09/2023
	CHECKED	BAS	05/09/2023
BAS PROJECT No. 21141501	FIGURE: **24**		



LEGEND

● SITE MONITORING WELL

▭ MODEL BOUNDARY

▭ APPROXIMATE SITE BOUNDARY

— AREA OF BARRIER WALL

— RELATIVE SURROGATE CONCENTRATIONS

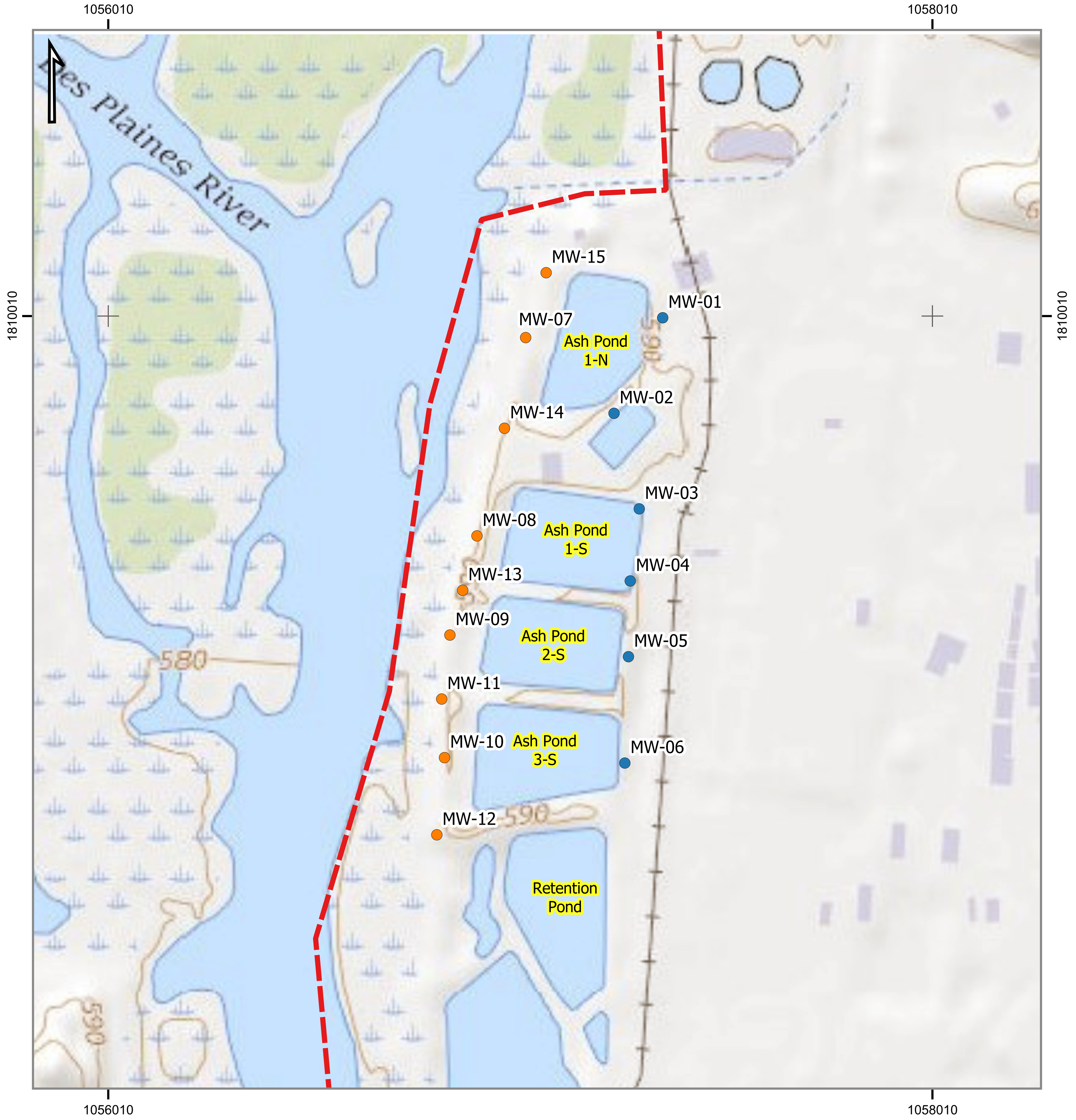
Maximum relative concentrations above competent bedrock

0 200 400 ft

FEET

Coordinate System:
NAD_1983_StatePlane_Illinois_East_FIPS_1201_Feet
Project File:
Figure25_RelativeSurrogateConcentrations_50_100_Years_Scenario4.qgz

CLIENT	MIDWEST GENERATION		
SITE	WILL COUNTY 529 OLD ROMEO RD, ROMEOVILLE, IL		
TITLE	**RELATIVE SURROGATE CONCENTRATIONS AT 50 AND 100 YEARS, SCENARIO 4**		
SCALE AT ANSI A 1:5,400	DRAWN	DZF	04/21/2023
	CHECKED	BAS	04/21/2023
BAS PROJECT No. 21141501		FIGURE: **25**	



LEGEND

● SELECTED SITE MONITORING WELL TO EVALUATE DECAY

● SITE MONITORING WELL

▭ APPROXIMATE SITE BOUNDARY

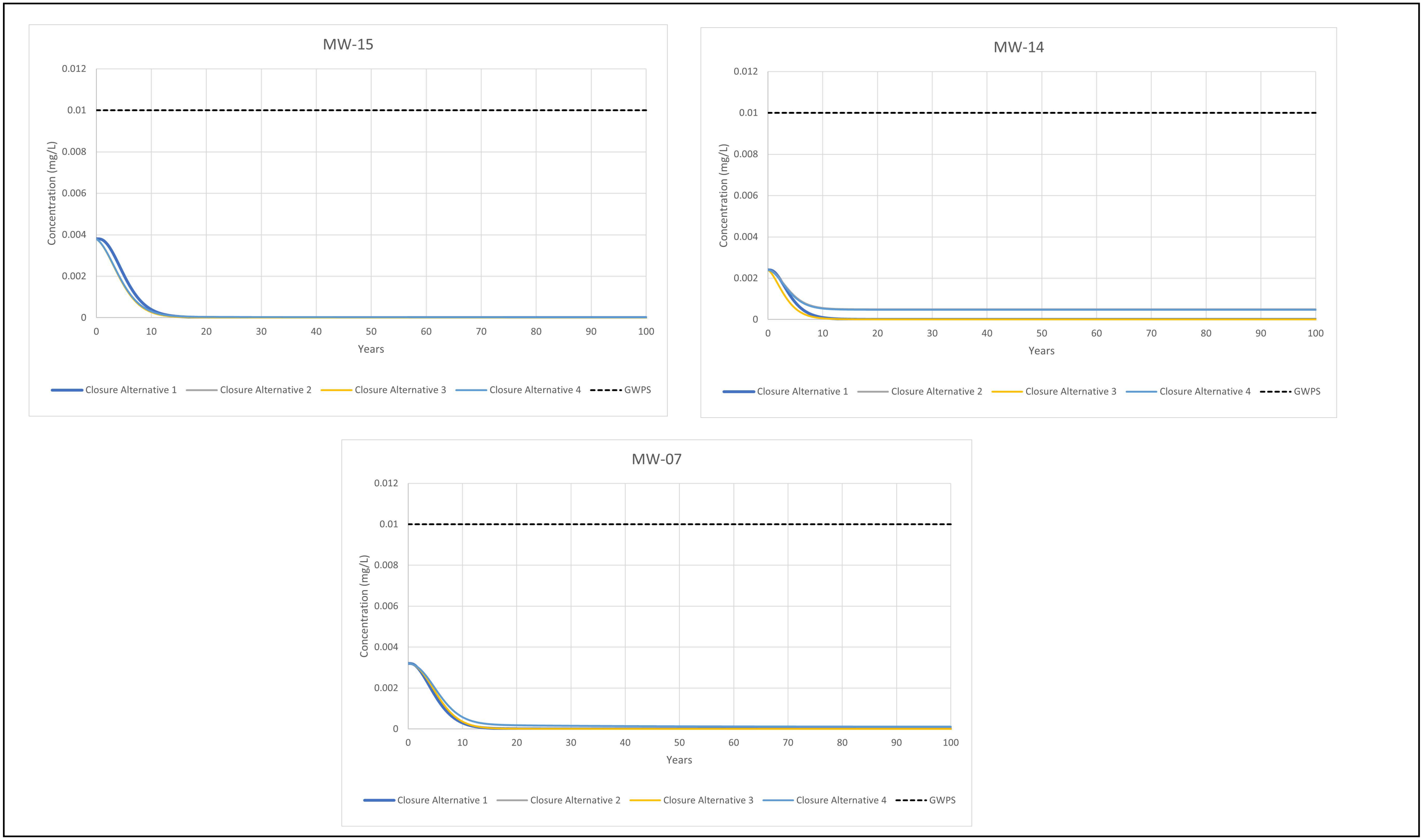
0 200 400 ft
FEET

Coordinate System:
NAD_1983_StatePlane_Illinois_East_FIPS_1201_Feet
Project File:
Figure26_SelectedMonitoringLocationsToEvaluateDecay.qgz

BAS GROUNDWATER CONSULTING KPRG

CLIENT	MIDWEST GENERATION
SITE	WILL COUNTY 529 OLD ROMEO RD, ROMEOVILLE, IL
TITLE	**SELECTED MONITORING LOCATIONS TO EVALUATE DECAY**

SCALE AT ANSI A 1:4,000	DRAWN	DZF	04/05/2023
	CHECKED	BAS	04/05/2023
BAS PROJECT No. 21141501		FIGURE: **26**	



BAS GROUNDWATER CONSULTING

KPRG

SCALE AT ANSI A

DRAWN DZF 03/20/2023

CHECKED BAS 03/20/2023

BAS PROJECT No.
21141501

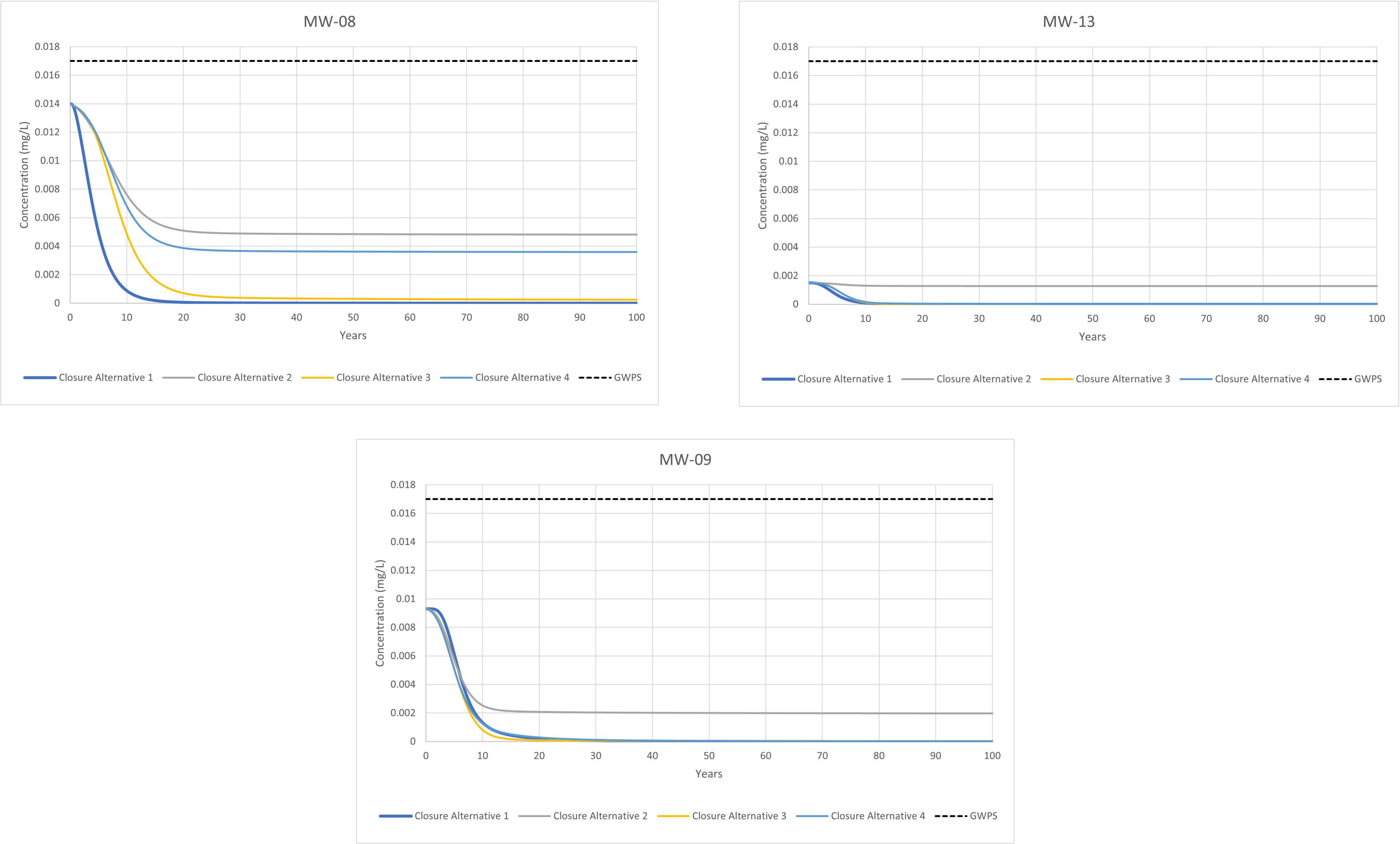
FIGURE:
27

CLIENT
MIDWEST
GENERATION

SITE
WILL COUNTY
529 OLD ROMEO RD, ROMEOVILLE, IL

TITLE
ARSENIC CONCENTRATIONS OVER TIME,
POND 1N DOWNGRADIENT WELLS

Project File: Figure27_ArsenicConcentrations.qgz



BAS GROUNDWATER CONSULTING

KPRG

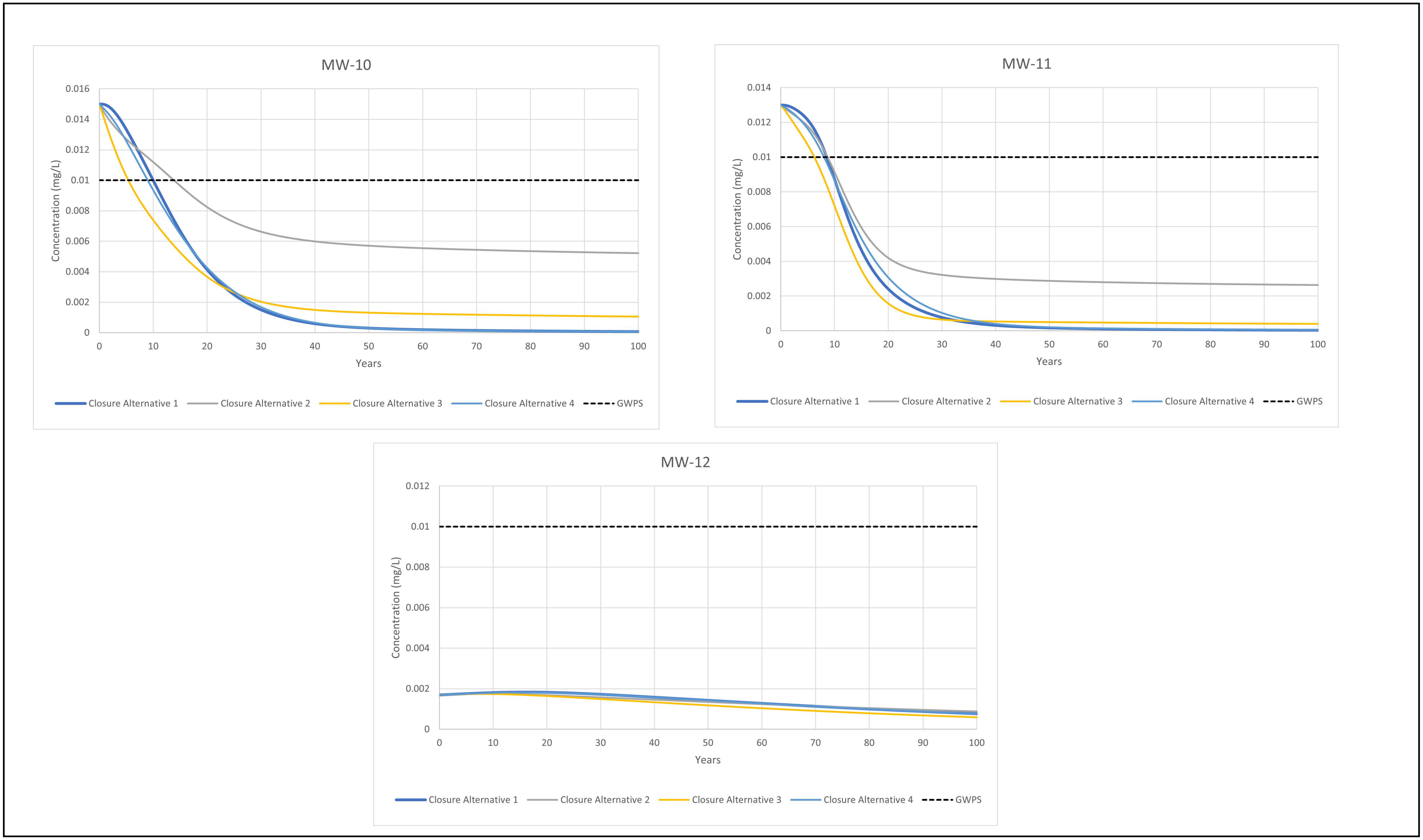
SCALE AT ANSI A	DRAWN DZF	03/20/2023
	CHECKED BAS	03/20/2023
BAS PROJECT No. 21141501	FIGURE: **28**	

CLIENT
MIDWEST
GENERATION

SITE
WILL COUNTY
529 OLD ROMEO RD, ROMEOVILLE, IL

TITLE
ARSENIC CONCENTRATIONS OVER TIME, POND 1S DOWNGRADIENT WELLS

Project File: Figure28_ArsenicConcentrations1S.qgz



BAS GROUNDWATER CONSULTING

KPRG

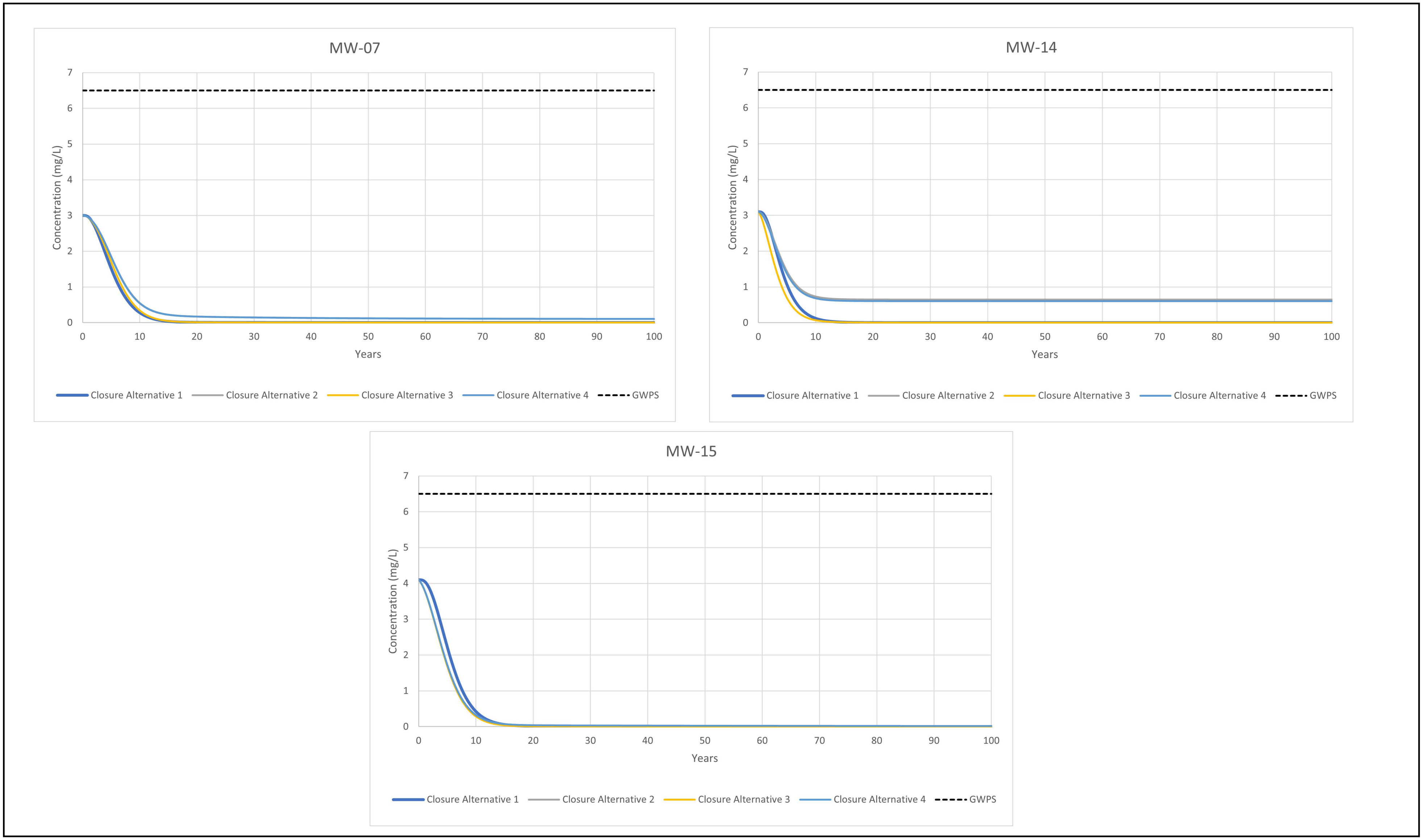
SCALE AT ANSI A	DRAWN	DZF	03/20/2023
	CHECKED	BAS	03/20/2023
BAS PROJECT No. 21141501		FIGURE: 29	

CLIENT
MIDWEST
GENERATION

SITE
WILL COUNTY
529 OLD ROMEO RD, ROMEOVILLE, IL

TITLE
ARSENIC CONCENTRATIONS OVER TIME,
PONDS 2S/3S DOWNGRADIENT WELLS

Project File: Figure29_ArsenicConcentrations2S3S.qgz



BAS GROUNDWATER CONSULTING

K P R G

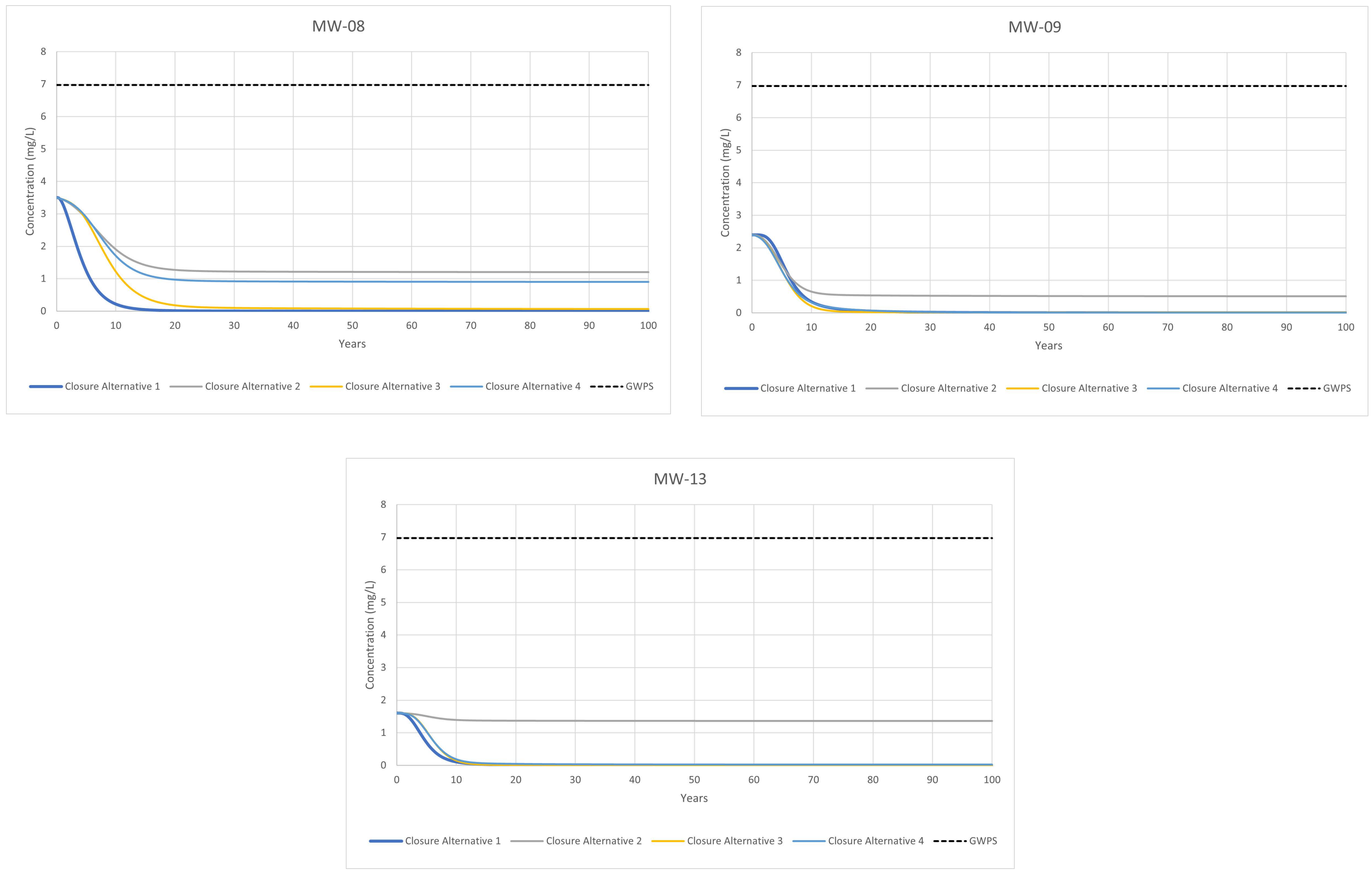
SCALE AT ANSI A	DRAWN	DZF	03/20/2023
	CHECKED	BAS	03/20/2023
BAS PROJECT No. 21141501		FIGURE: **30**	

CLIENT
MIDWEST
GENERATION

SITE
WILL COUNTY
529 OLD ROMEO RD, ROMEOVILLE, IL

TITLE
BORON CONCENTRATIONS OVER TIME,
POND 1N DOWNGRADIENT WELLS

Project File: Figure30_BoronConcentrations1N.qgz



BAS GROUNDWATER CONSULTING

KPRG

SCALE AT ANSI A	*DRAWN*	*DZF*	*03/20/2023*
	CHECKED	*BAS*	*03/20/2023*
BAS PROJECT No. *21141501*		*FIGURE:* **31**	

CLIENT

MIDWEST
GENERATION

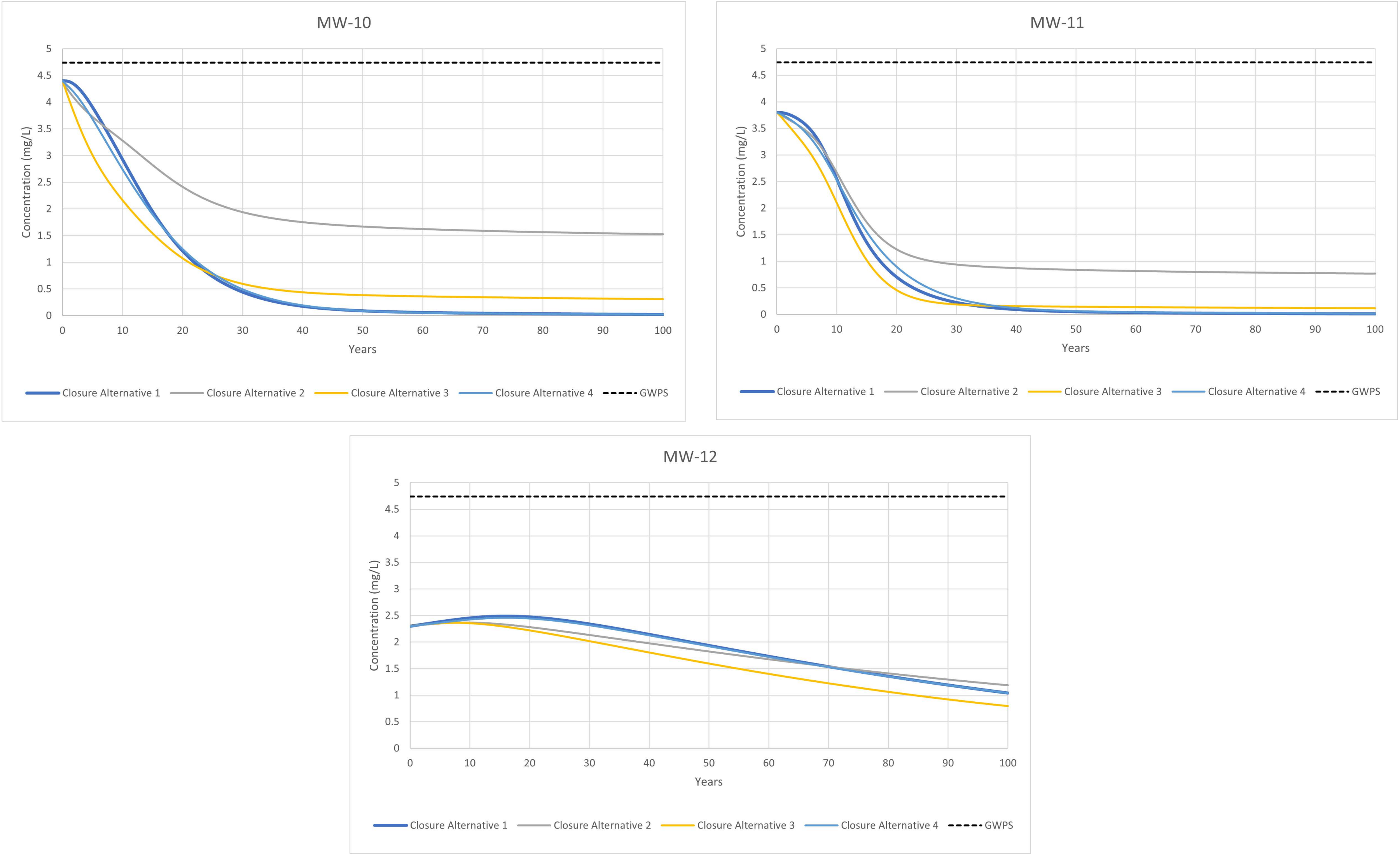
SITE

WILL COUNTY
529 OLD ROMEO RD, ROMEOVILLE, IL

TITLE

**BORON CONCENTRATIONS OVER TIME,
POND 1S DOWNGRADIENT WELLS**

Project File: Figure31_BoronConcentrations1S.qgz



CLIENT
MIDWEST
GENERATION

SITE
WILL COUNTY
529 OLD ROMEO RD, ROMEOVILLE, IL

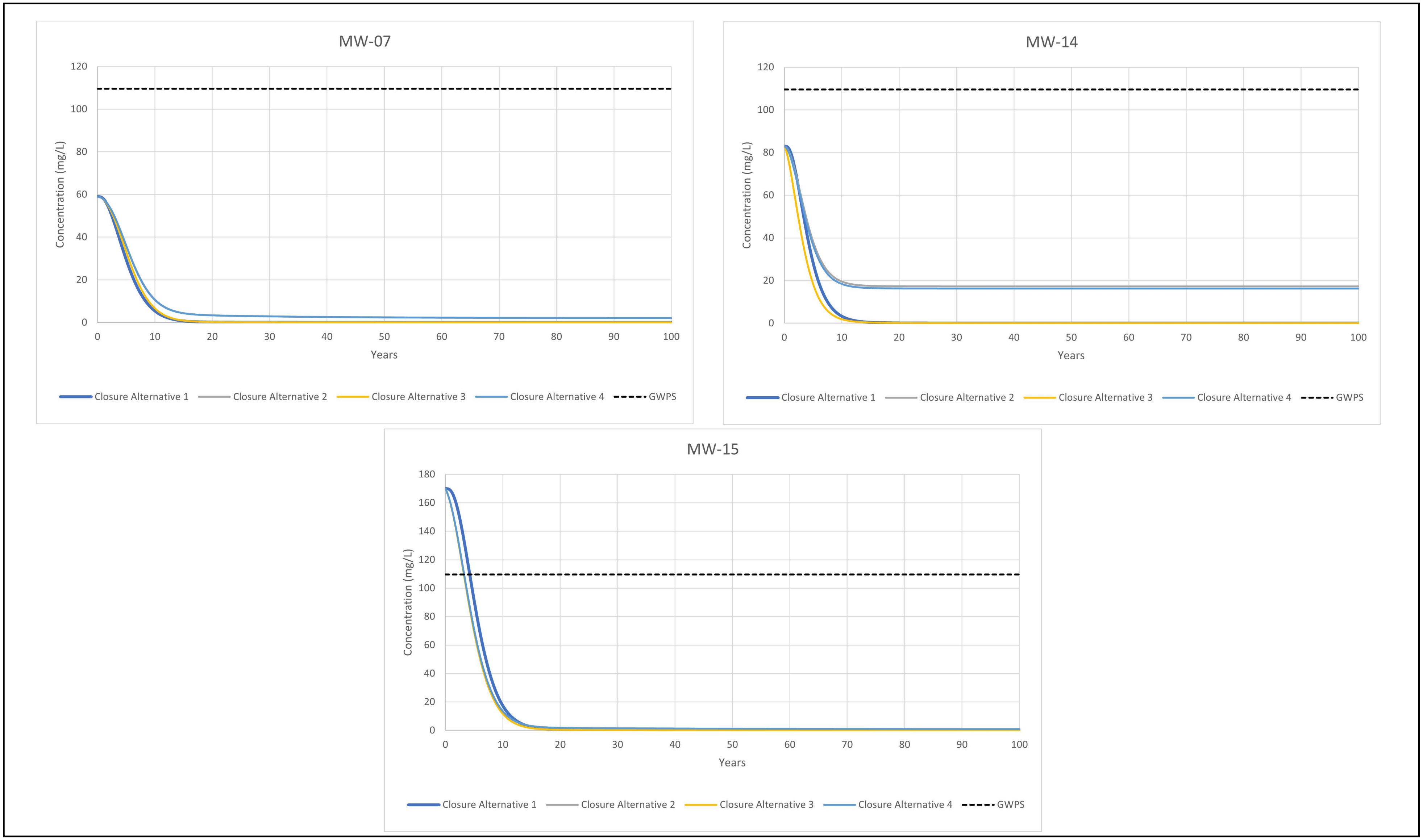
TITLE
BORON CONCENTRATIONS OVER TIME,
POND 2S/3S DOWNGRADIENT WELLS

SCALE AT ANSI A	DRAWN	DZF	03/20/2023
	CHECKED	BAS	03/20/2023

BAS PROJECT No. 21141501

FIGURE: **32**

Project File: Figure32_BoronConcentrations2S3S.qgz



BAS GROUNDWATER CONSULTING

K P R G

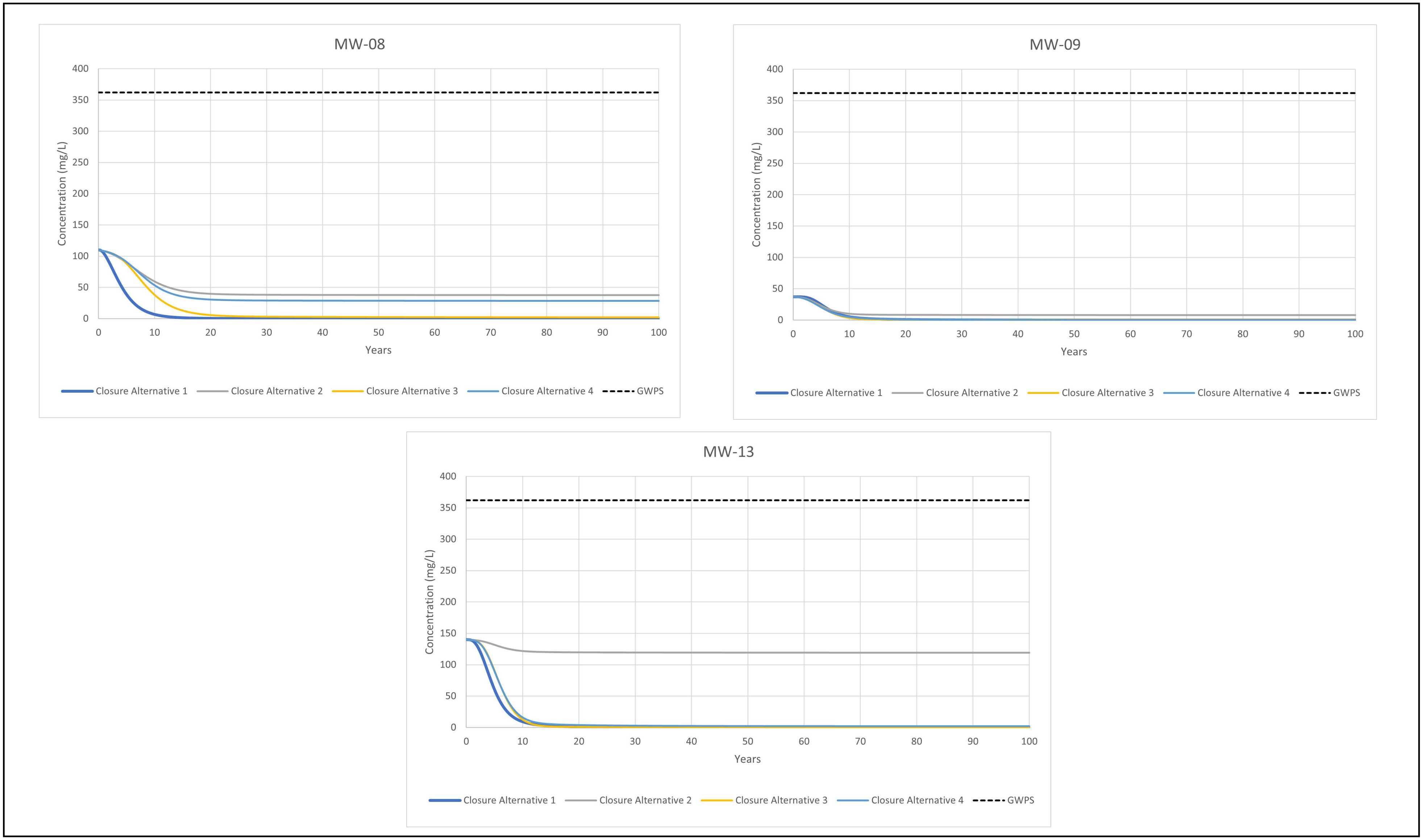
SCALE AT ANSI A	*DRAWN*	*DZF*	03/20/2023
	CHECKED	*BAS*	03/20/2023
BAS PROJECT No. *21141501*		*FIGURE:* **33**	

CLIENT
MIDWEST
GENERATION

SITE
WILL COUNTY
529 OLD ROMEO RD, ROMEOVILLE, IL

TITLE
CALCIUM CONCENTRATIONS OVER TIME,
POND 1N DOWNGRADIENT WELLS

Project File: Figure33_CalciumConcentrations1N.qgz



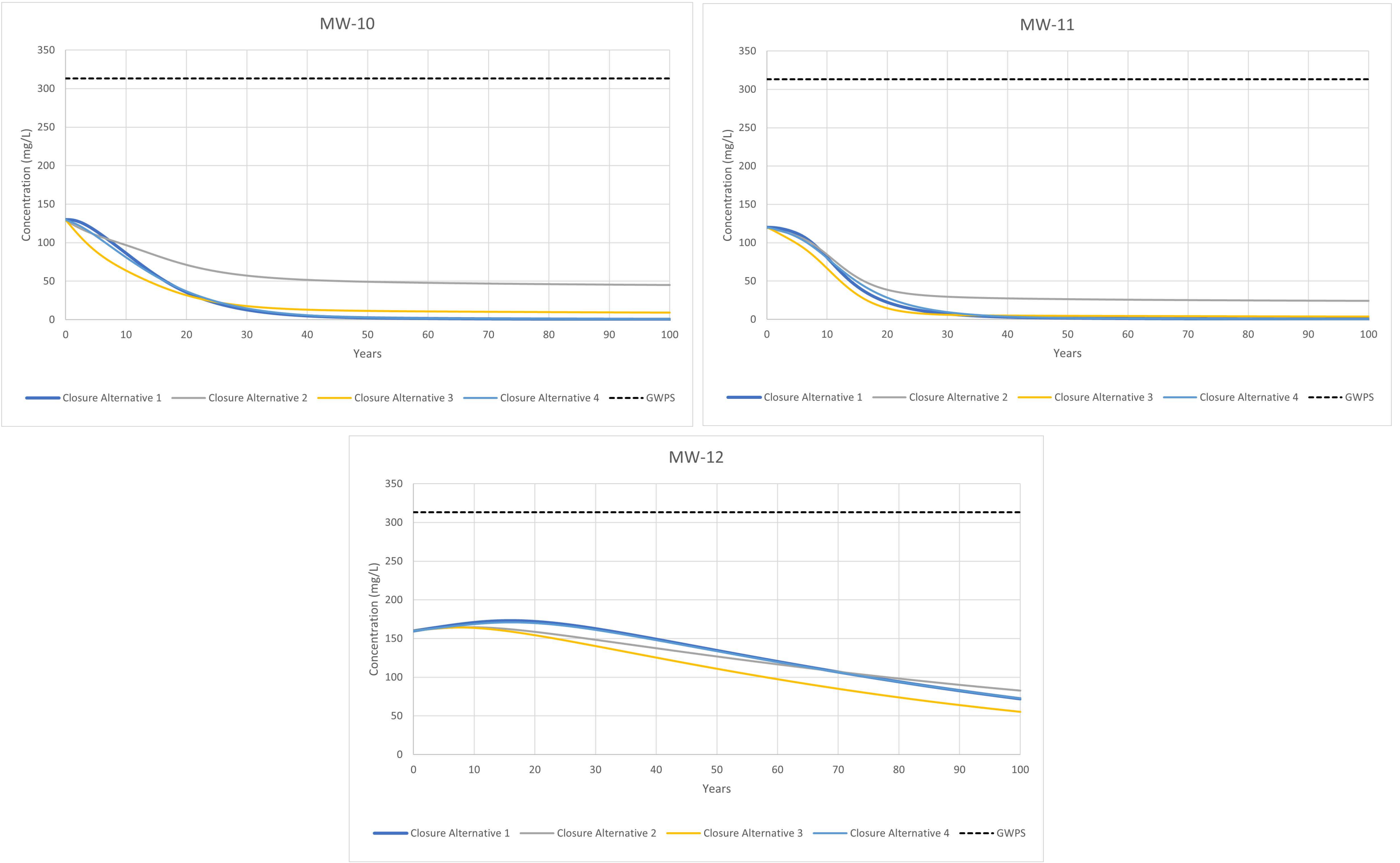
SCALE AT ANSI A	DRAWN	DZF	03/20/2023
	CHECKED	BAS	03/20/2023
BAS PROJECT No. 21141501	FIGURE: 34		

CLIENT
MIDWEST
GENERATION

SITE
WILL COUNTY
529 OLD ROMEO RD, ROMEOVILLE, IL

TITLE
CALCIUM CONCENTRATIONS OVER TIME, POND 1S DOWNGRADIENT WELLS

Project File: Figure34_CalciumConcentrations1S.qgz



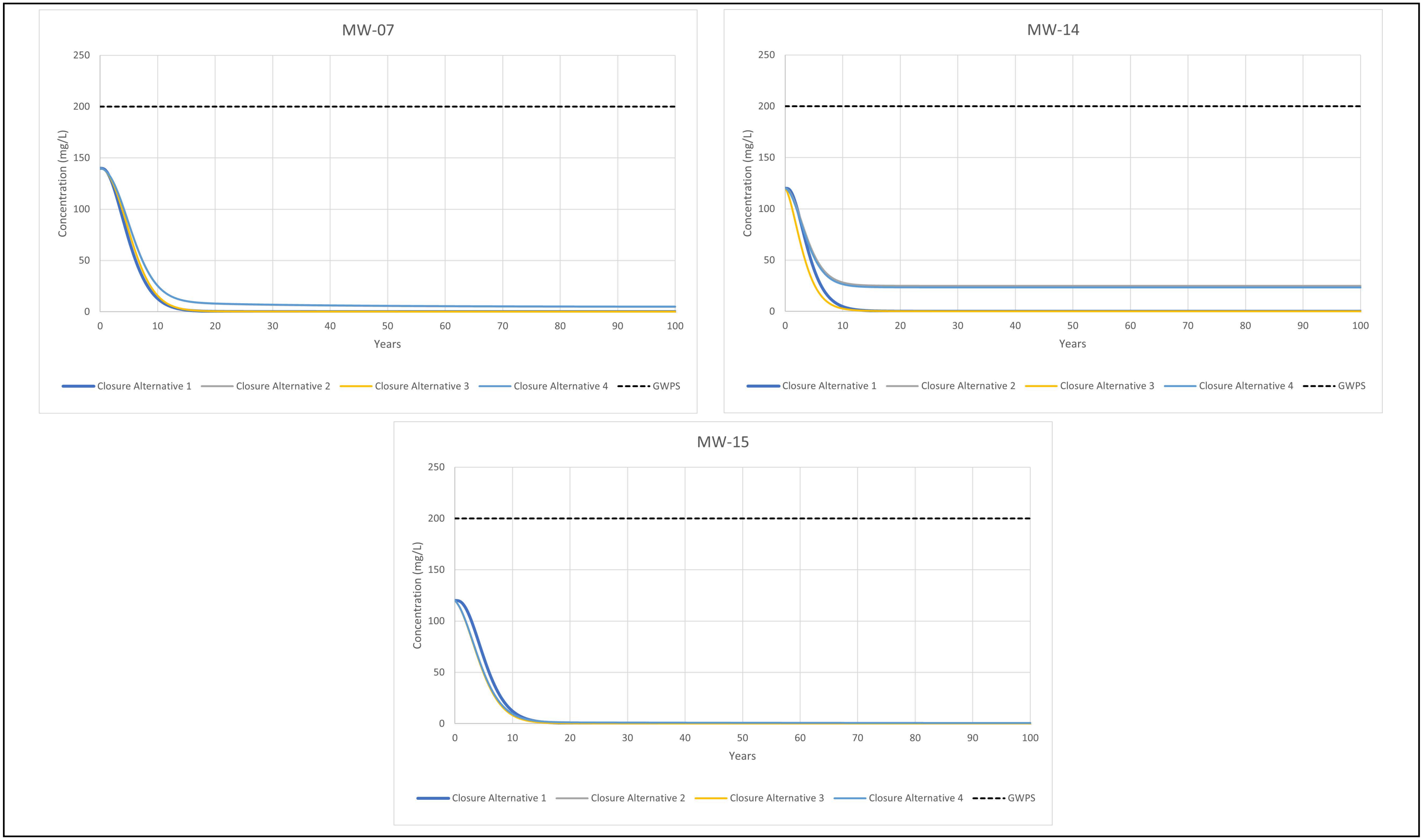
SCALE AT ANSI A	DRAWN	DZF	03/20/2023
	CHECKED	BAS	03/20/2023
BAS PROJECT No. 21141501		FIGURE: **35**	

CLIENT
MIDWEST
GENERATION

SITE
WILL COUNTY
529 OLD ROMEO RD, ROMEOVILLE, IL

TITLE
CALCIUM CONCENTRATIONS OVER TIME, PONDS 2S/3S DOWNGRADIENT WELLS

Project File: Figure35_CalciumConcentrations2S3S.qgz



BAS GROUNDWATER CONSULTING

KPRG

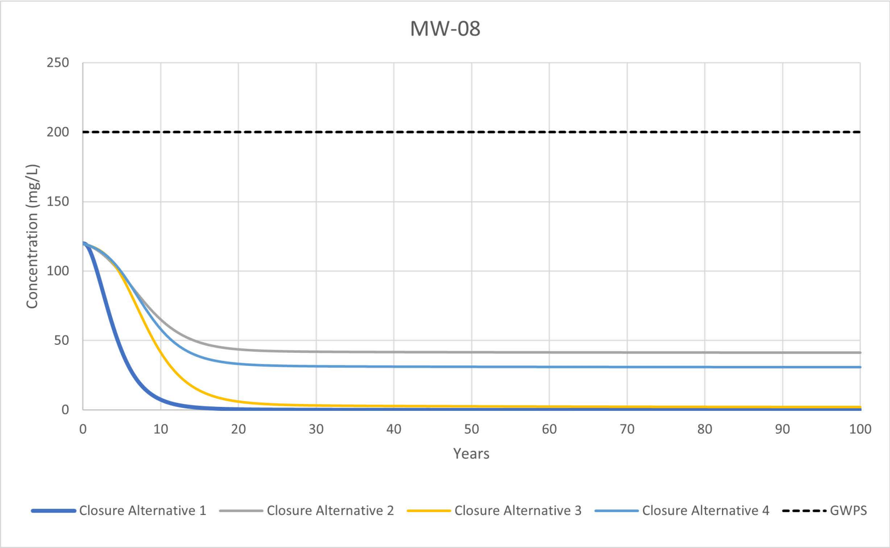
SCALE AT ANSI A	DRAWN	DZF	03/20/2023
	CHECKED	BAS	03/20/2023
BAS PROJECT No. 21141501		FIGURE: **36**	

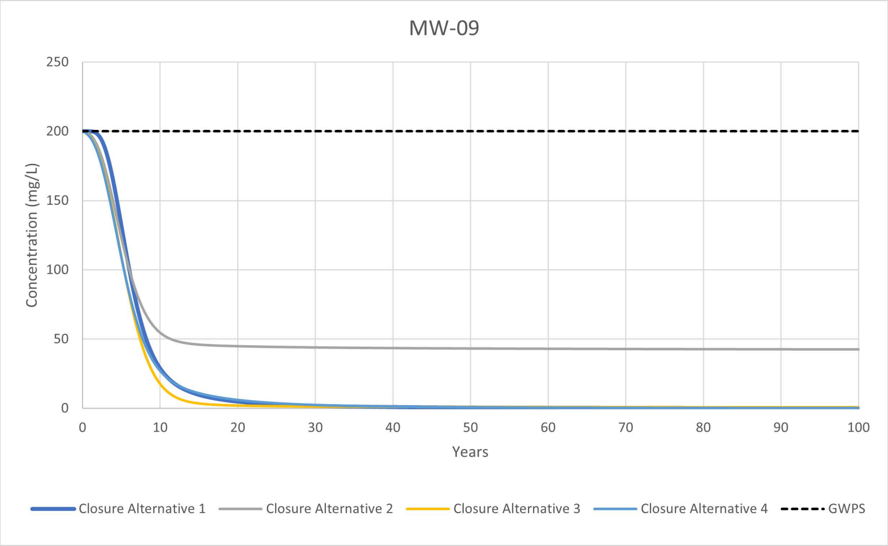
CLIENT
MIDWEST
GENERATION

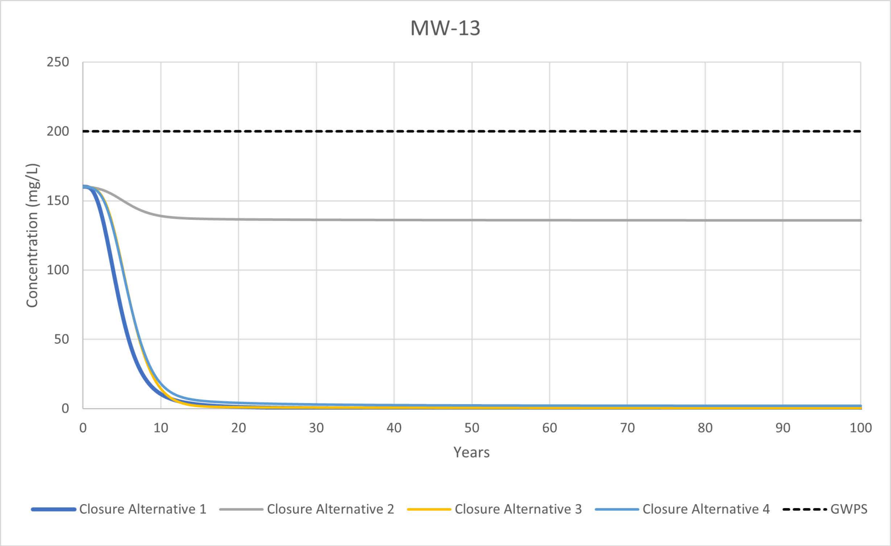
SITE
WILL COUNTY
529 OLD ROMEO RD, ROMEOVILLE, IL

TITLE
CHLORIDE CONCENTRATIONS OVER TIME,
POND 1N DOWNGRADIENT WELLS

Project File: Figure36_ChlorideConcentrations1N.qgz







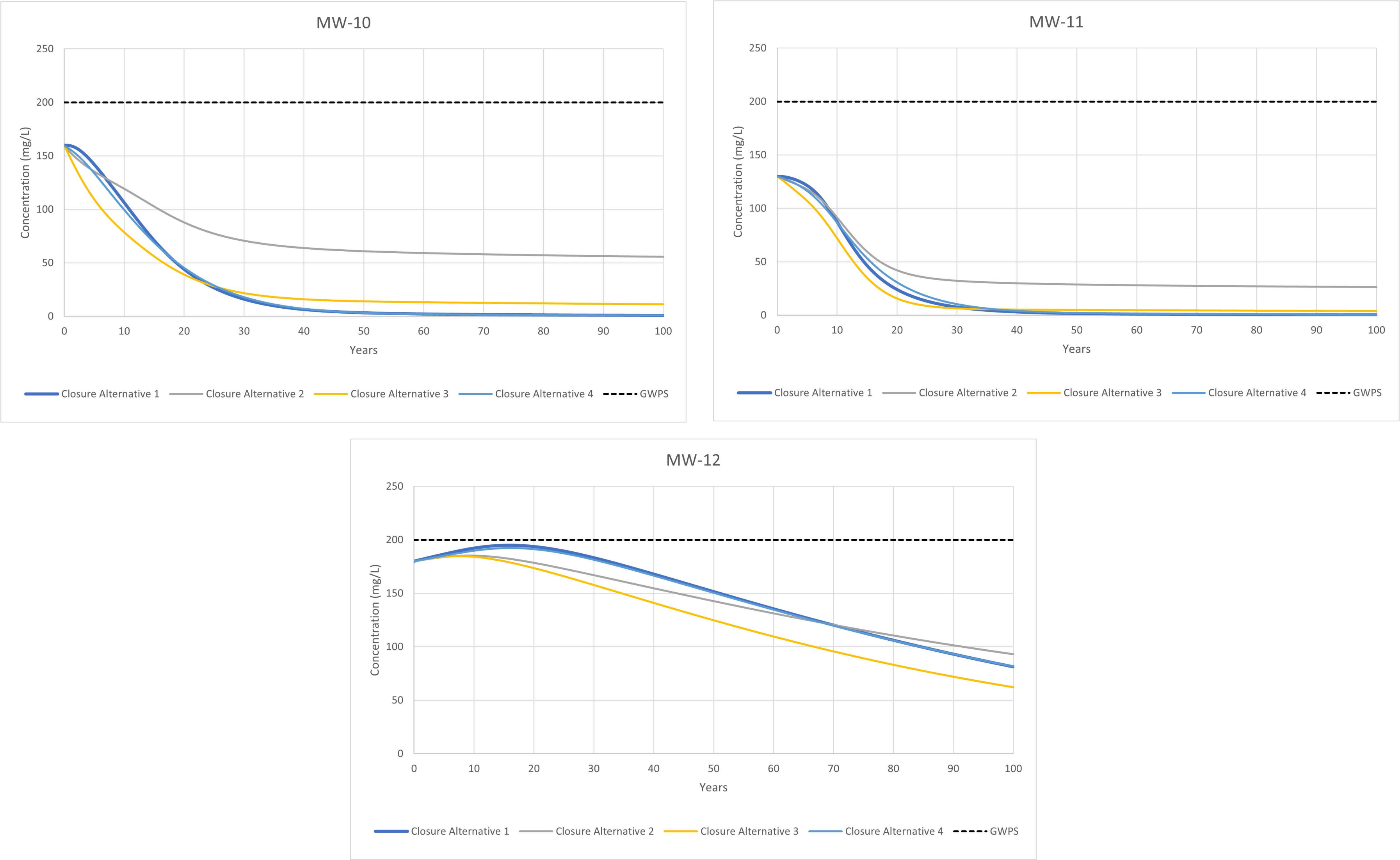
SCALE AT ANSI A	*DRAWN*	*DZF*	03/20/2023
	CHECKED	*BAS*	03/20/2023
BAS PROJECT No. *21141501*		*FIGURE:* **37**	

CLIENT
MIDWEST
GENERATION

SITE
WILL COUNTY
529 OLD ROMEO RD, ROMEOVILLE, IL

TITLE
CHLORIDE CONCENTRATIONS OVER TIME,
POND 1S DOWNGRADIENT WELLS

Project File: Figure37_ChlorideConcentrations1S.qgz



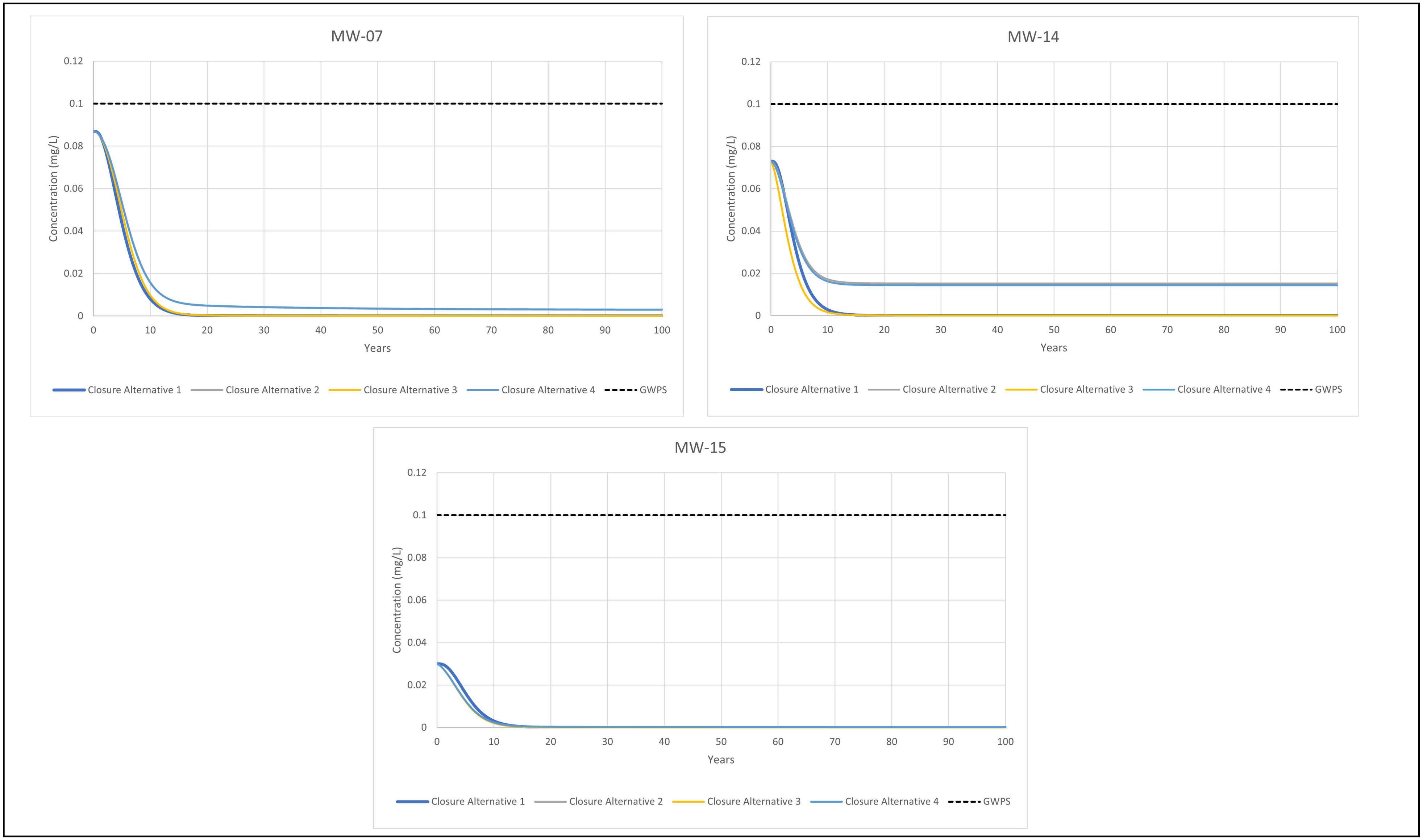
CLIENT
MIDWEST
GENERATION

SITE
WILL COUNTY
529 OLD ROMEO RD, ROMEOVILLE, IL

TITLE
CHLORIDE CONCENTRATIONS OVER TIME,
PONDS 2S/3S DOWNGRADIENT WELLS

SCALE AT ANSI A
DRAWN *DZF* 03/20/2023
CHECKED *BAS* 03/20/2023
BAS PROJECT No. *21141501*
FIGURE: **38**

Project File: Figure38_ChlorideConcentrations2S3S.qgz



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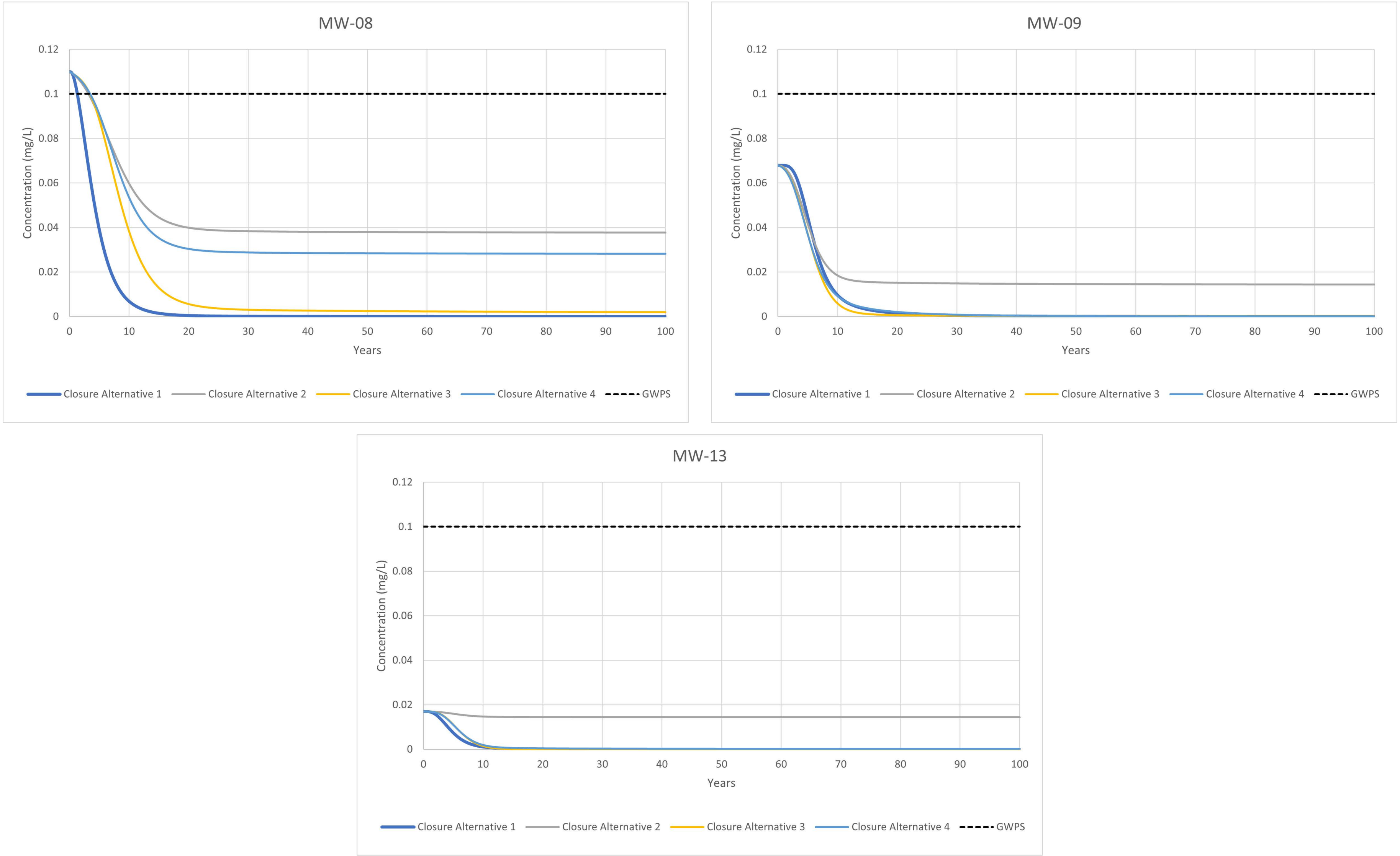
SCALE AT ANSI A	DRAWN	DZF	03/20/2023
	CHECKED	BAS	03/20/2023
BAS PROJECT No. 21141501		FIGURE: **39**	

CLIENT
MIDWEST
GENERATION

SITE
WILL COUNTY
529 OLD ROMEO RD, ROMEOVILLE, IL

TITLE
MOLYBDENUM CONCENTRATIONS OVER TIME, POND 1N DOWNGRADIENT WELLS

Project File: Figure39_MolybdenumConcentrations1N.qgz



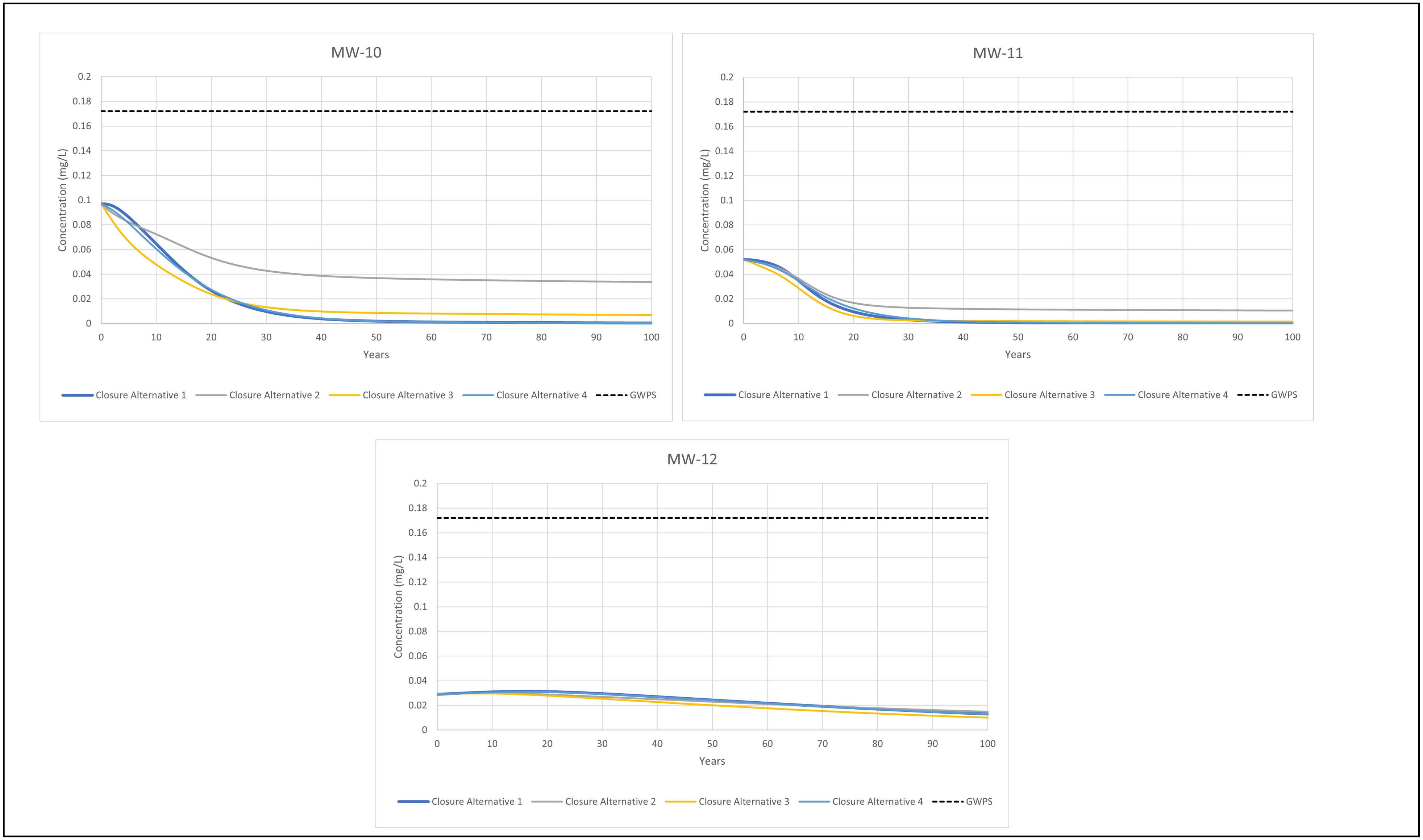
SCALE AT ANSI A	DRAWN DZF	03/20/2023
	CHECKED BAS	03/20/2023
BAS PROJECT No. 21141501	FIGURE: **40**	

CLIENT
MIDWEST
GENERATION

SITE
WILL COUNTY
529 OLD ROMEO RD, ROMEOVILLE, IL

TITLE
MOLYBDENUM CONCENTRATIONS OVER TIME, POND 1S DOWNGRADIENT WELLS

Project File: Figure40_MolybdenumConcentrations1S.qgz



BAS GROUNDWATER CONSULTING

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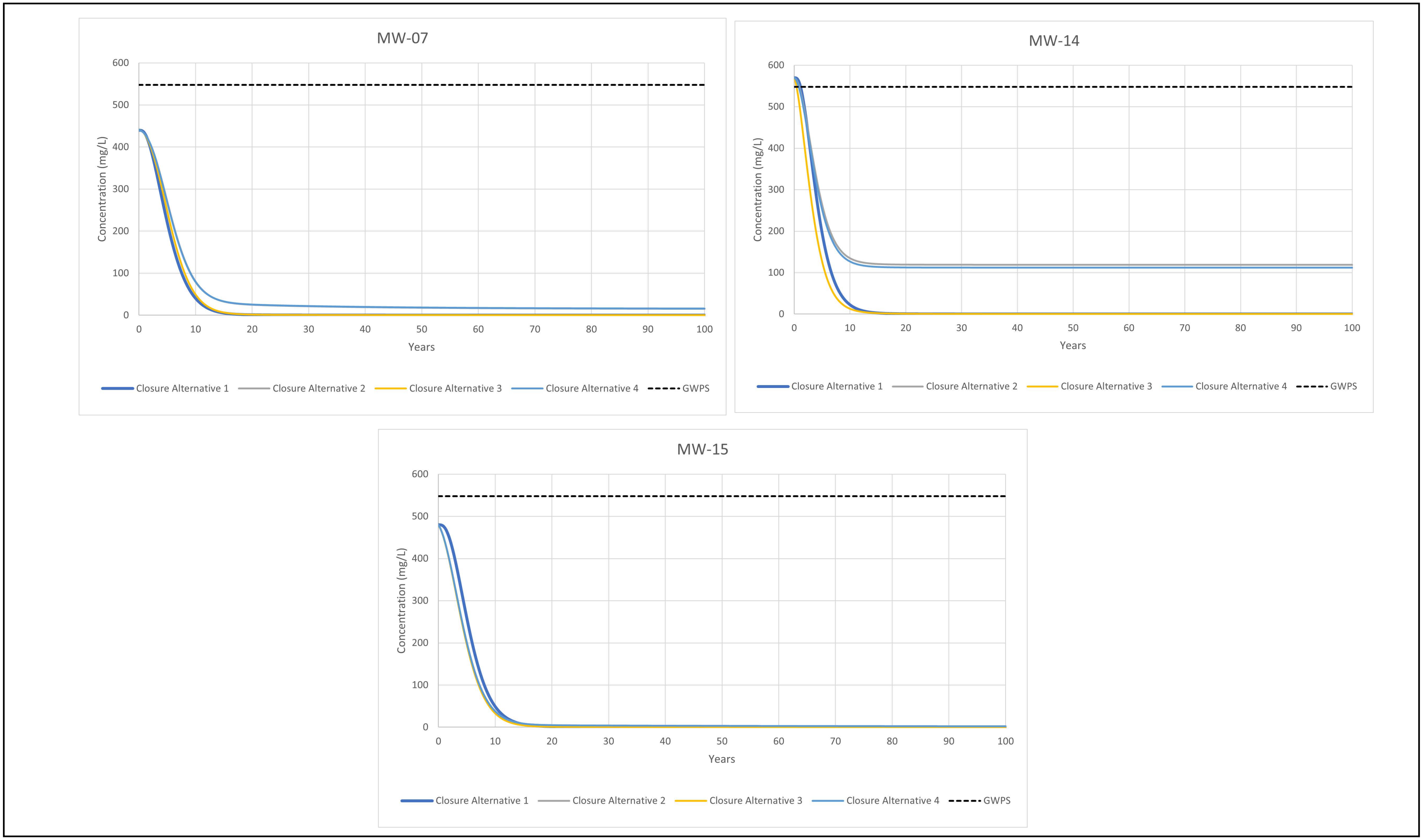
SCALE AT ANSI A	DRAWN	DZF	03/20/2023
	CHECKED	BAS	03/20/2023
BAS PROJECT No. 21141501		FIGURE: **41**	

CLIENT
MIDWEST GENERATION

SITE
WILL COUNTY
529 OLD ROMEO RD, ROMEOVILLE, IL

TITLE
MOLYBDENUM CONCENTRATIONS OVER TIME, PONDS 2S/3S DOWNGRADIENT WELLS

Project File: Figure41_MolybdenumConcentrations2S3S.qgz



BAS GROUNDWATER CONSULTING

K P R G

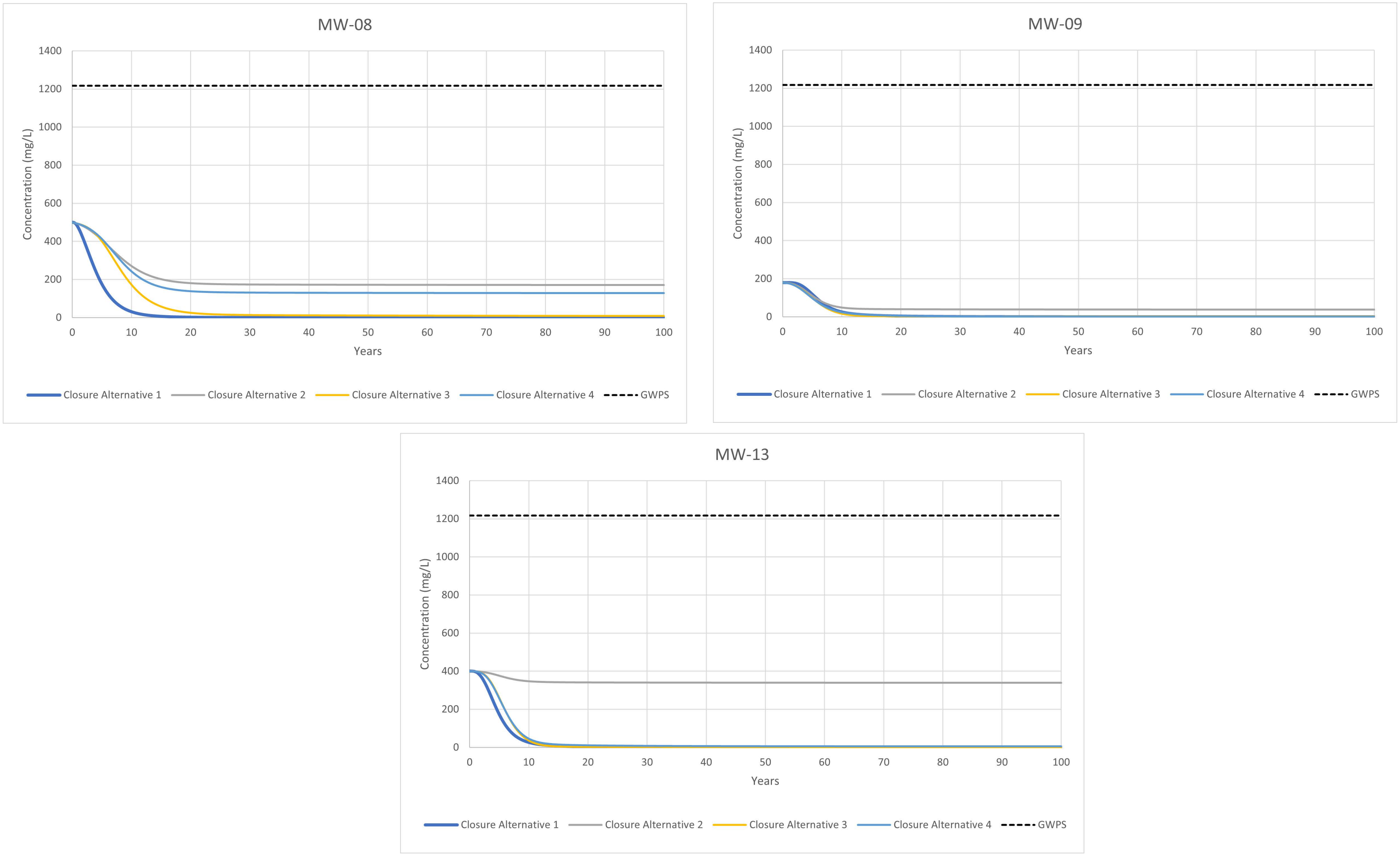
SCALE AT ANSI A	DRAWN	DZF	03/20/2023
	CHECKED	BAS	03/20/2023
BAS PROJECT No. 21141501		FIGURE: **42**	

CLIENT
MIDWEST
GENERATION

SITE
WILL COUNTY
529 OLD ROMEO RD, ROMEOVILLE, IL

TITLE
SULFATE CONCENTRATIONS OVER TIME, POND 1N DOWNGRADIENT WELLS

Project File: Figure42_SulfateConcentrations1N.qgz



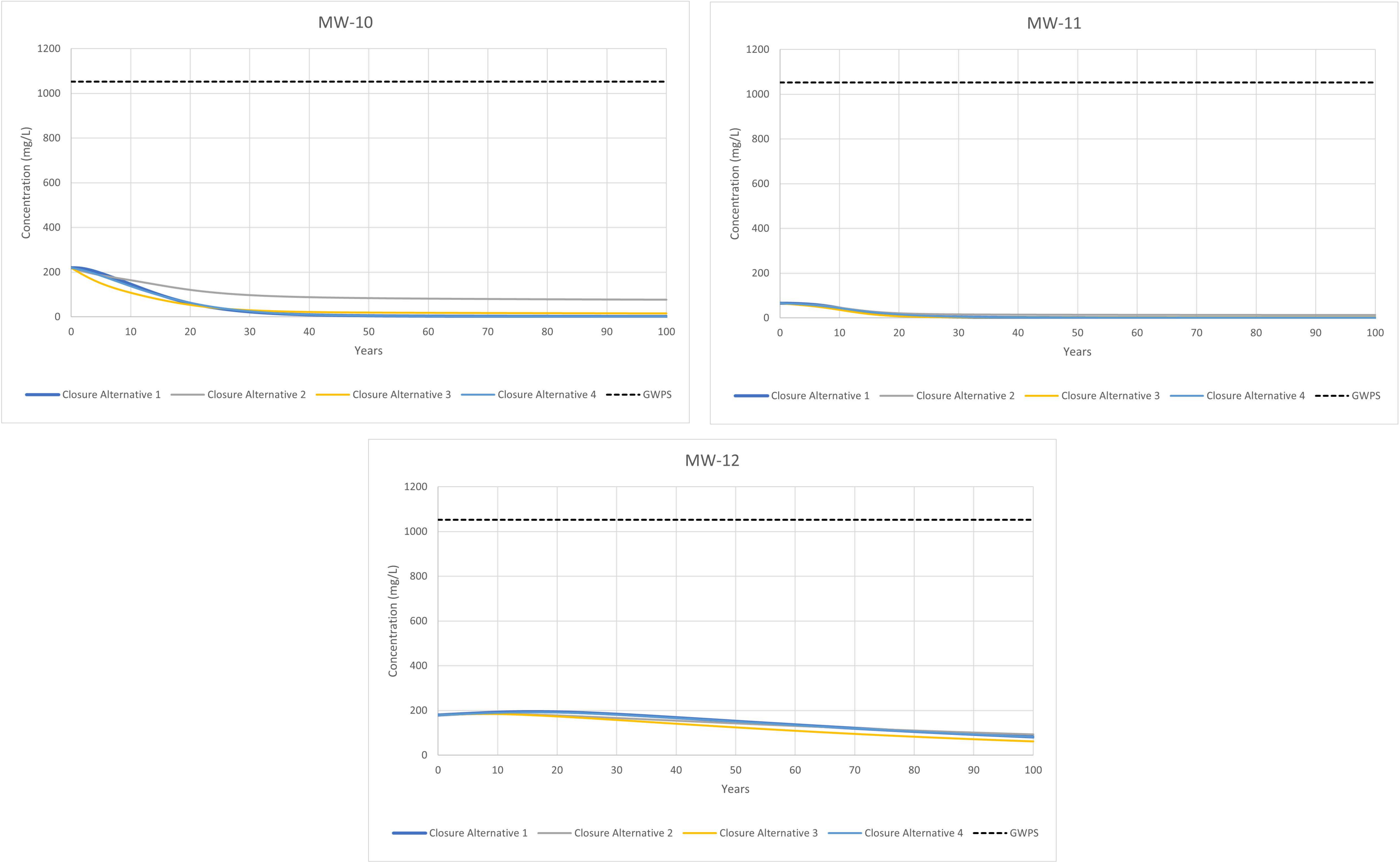
SCALE AT ANSI A	DRAWN DZF	03/20/2023
	CHECKED BAS	03/20/2023
BAS PROJECT No. 21141501	FIGURE: 43	

CLIENT
MIDWEST
GENERATION

SITE
WILL COUNTY
529 OLD ROMEO RD, ROMEOVILLE, IL

TITLE
SULFATE CONCENTRATIONS OVER TIME, POND 1S DOWNGRADIENT WELLS

Project File: Figure43_SulfateConcentrations1S.qgz



SCALE AT ANSI A	*DRAWN*	*DZF*	03/20/2023
	CHECKED	*BAS*	03/20/2023
BAS PROJECT No. *21141501*		*FIGURE:* **44**	

CLIENT
MIDWEST
GENERATION

SITE
WILL COUNTY
529 OLD ROMEO RD, ROMEOVILLE, IL

TITLE
SULFATE CONCENTRATIONS OVER TIME, PONDS 2S/3S DOWNGRADIENT WELLS

Project File: Figure44_SulfateConcentrations2S3S.qgz

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ATTACHMENT 9
GROUNDWATER MONITORING INFORMATION

Attachment 9-1 – Local Well Stratigraphy Information

ID	Well_Count	Well_ID	From	To	Original Logged Description	Grouped As_ToUseToDefine_K_intervals	Base of Model	Notes	Ignored
1	1	121974178000	0	18	fill, clay	FILL			
2		121974178000	18	120	limestone	Carbonates			
3		121974178000	120	200	soft green shale	shale	x	Assumed base of model	
4		121974178000	200	300	limestone mix shale streaks	Carbonates and Shale			x
5	2	121974281000	0	62	limestone	Carbonates			
6		121974281000	62	71	limestone w/shale layers	Carbonates and Shale			
7		121974281000	71	77	limestone	Carbonates			
8		121974281000	77	79	limestone - shale mix	Carbonates and Shale			
9		121974281000	79	128	limestone	Carbonates			
10		121974281000	128	216	shale	shale	x	Assumed base of model	
11		121974281000	216	233	limestone-shale mix	Carbonates and Shale			x
12		121974281000	233	312	shale	shale			x
13		121974281000	312	497	limestone	Carbonates			x
14		121974281000	497	505	limestone with shale streaks	Carbonates and Shale			x
15		121974281000	505	536	limestone	Carbonates			x
16		121974281000	536	540	limestone with shale layers	Carbonates and Shale			x
17	3	121973091600	0	3	sand & gravel	sand and gravel			
18		121973091600	3	140	rock	Carbonates			
19		121973091600	140	160	shale	shale	x		
20	4	121973467500	0	15	clay & gravel	clay, sand, gravel			
21		121973467500	15	145	rock	Carbonates			
22		121973467500	145	180	shale	shale	x		
23	5	121972436300	0	1	drift	sand			
24		121972436300	1	145	lime	Carbonates			
25		121972436300	145	239	shale & lime - Maquoketa	shale	x		
26		121972436300	239	330	shale w/lime	Carbonates and Shale			x
27		121972436300	330	433	lime & shale - Galena	sandstone			x
28		121972436300	433	676	lime	carbonates			x
29		121972436300	676	690	sand w/lime - St. Peter	sandstone			x
30		121972436300	690	780	sand w/ lime & shale	sandstone			x
31		121972436300	780	798	sand & lime	sandstone			x
32		121972436300	798	860	lime - Knox	sandstone			x
33		121972436300	860	913	lime & dolomite sand	carbonates			x
34		121972436300	913	1009	lime	carbonates			x
35		121972436300	1009	1100	lime w/sand	carbonates			x
36		121972436300	1100	1176	gray lime	carbonates			x
37		121972436300	1176	1190	lime	carbonates			x
38		121972436300	1190	1300	lime w/sand - Franconia	carbonates			x
39		121972436300	1300	1350	sand w/lime - Ironton	sandstone			x
40		121972436300	1350	1477	sand	sandstone			x
41		121972436300	1477	1510	lime - Eau Claire	carbonates			x
42	6	121972438900	0	88	drift	sand			
43		121972438900	88	153	lime	Carbonates			
44		121972438900	153	218	sandy lime	Carbonates			
45		121972438900	218	611	lime & shale	shale	x		
46		121972438900	611	683	lime - St. Peter @665'	sandstone			x
47		121972438900	683	835	sand - Knox @ 790'	sandstone			x
48		121972438900	835	889	lime & shale	carbonates			x
49		121972438900	889	1199	lime	carbonates			x
50		121972438900	1199	1465	sand w/lime - Franconia, Ironton @ 1290'	sandstone			x
51		121972438900	1465	1503	lime - Eau Claire @ 1485'	carbonates			x
52	7	121970352400	0	15	sandy clay	clay, sand			
53		121970352400	15	39	gravel	sand and gravel			
54		121970352400	39	42	broken limestone	Carbonates			
55		121970352400	42	115	limestone	Carbonates			
56	8	121970127500	0	135	No Record				
57		121970127500	135	315	Maquoketa	shale	x		
58		121970127500	315	665	Galena	sandstone			x
59		121970127500	665	790	St Peter	sandstone			x
60		121970127500	790	1185	Knox	sandstone			x
61		121970127500	1185	1300	Franconia	sandstone			x
62		121970127500	1300	1475	Ironton	sandstone			x
63		121970127500	1475	1536	Eau Claire	sandstone			x
64	9	121970025300	0	156	limestone	Carbonates			
65		121970025300	156	317	Maquoketa	shale	x		
66		121970025300	317	660	Galena	sandstone			x
67		121970025300	660	944	St Peter	sandstone			x
68		121970025300	944	1197	Knox	sandstone			x
69		121970025300	1197	1300	Franconia	sandstone			x
70		121970025300	1300	1497	Ironton	sandstone			x
71		121970025300	1497	1509	Eau Claire	sandstone			x
72	10	121970184300	0	42	overburden	topsoil			
73		121970184300	42	160	rock formation	Carbonates			
74	11	121972479600	0	5	clay	clay			
75		121972479600	5	55	limestone	Carbonates			
76		121972479600	55	100	shale	shale	x	We could ignore this 45 feet of "shale" if we think it is wrong	
77		121972479600	100	145	limestone	Carbonates			x
78	12	121972583600	0	50	till	overburden			
79		121972583600	50	60	limestone	Carbonates			
80	13	121970127600	124	310	Maquoketa	shale	x		
81		121970127600	310	670	Galena	sandstone			x
82		121970127600	670	830	St Peter	sandstone			x
83		121970127600	830	1180	Knox	sandstone			x
84		121970127600	1180	1290	Franconia	sandstone			x
85		121970127600	1290	1485	Ironton	sandstone			x
86		121970127600	1485	1535	Eau Claire	sandstone			x
87	13	121974644100	0	3	Topsoil	topsoil			
88		121974644100	3	20	clay-shale	clay			
89		121974644100	20	49	dolomite	carbonates			
90	14	121974634900	0	1	Sugar Run-Romeo Trans	carbonates			
91		121974634900	1	21.6	Romeo Dolomite	carbonates			
92		121974634900	21.6	23.1	Romeo-Markgraf Trans	carbonates			
93		121974634900	23.1	43.7	Markgraf Trans	carbonates			
94		121974634900	43.7	44.9	Markgraf-Brandon Bridge Trans	carbonates			
95		121974634900	44.9	53	Brandon Bridge Dolomite	carbonates			
96	15	121974482200	0	0.42	Asphalt 5"				
97		121974482200	0.42	1.25	Brown sand & gravel, damp (base) 10"	sand and gravel			
98		121974482200	1.25	4	Fill	fill			
99		121974482200	4	5	Brown limestone weathered	Carbonates			
100		121974482200	5	15	Brown limestone	Carbonates			
101	16	121974655800	0	0.5	black loam	loam			
102		121974655800	0.5	1.42	yellow clayey silt & broken rock	silt and clay			
103		121974655800	1.42	11.42	white limestone	Carbonates			
104	17	121974655900	0	0.5	black loam	loam			
105		121974655900	0.5	1	yellow clayey silt & broken rock	silt and clay			
106		121974655900	1	11.25	white limestone	Carbonates			

107	18	121974653200	0	1	soft black clayey loam with some pieces of rock	loam			
108		121974653200	1	3.5	large pieces of rock with some clay	clay, sand, gravel			
109		121974653200	3.5	8	silty hard gray clay with some rock fragments and gra	clay, sand, gravel			
110		121974653200	8	18.83	silty hard gray clay with some small to very large rock	clay, sand, gravel			
111		121974653200	18.83	19.17	white limestone	Carbonates			
112		121974653200	19.17	24.5	silty hard gray clay with some small to very large rock	clay, sand, gravel			
113		121974653200	24.5	35	hard green shale with some seams of clay	shale			x
114		121974653200	35	36	greenish white limestone with some seams of clay	Carbonates			
115	19	121974655100	0	0.5	black loam	loam			
116		121974655100	0.5	4.83	yellow clayey silt & broken rock	silt and clay			
117		121974655100	4.83	15	white limestone	Carbonates			
118		121974655100	15	23.5	shale & disintegrated rock	shale			x
119	20	121974654900	0	0.67	soft black clay loam with some pieces of rock	loam			
120		121974654900	0.67	5.42	very large pieces of yellow limestone	Carbonates			
121		121974654900	5.42	49.25	white limestone	Carbonates			
122		121974654900	49.25	54.25	very hard white-green & pink limestone	Carbonates			
123	21	121974652500	0	0.5	black loam	loam			
124		121974652500	0.5	1	yellow clayey silt and broken rock	silt and clay			
125		121974652500	1	5.67	white limestone	Carbonates			
126		121974652500	5.67	6	gray sandy silt	sand			
127		121974652500	6	11	white limestone	Carbonates			
128	22	121974650200	0	12	Silty clay sinkhole filling	fill			
129		121974650200	12	24.2	dolomite	carbonates			
130	23	121974648700	0	2.5	Weathered brown dolomite and clay	carbonates			
131		121974648700	2.5	5.5	dolomite	carbonates			
132		121974648700	5.5	8.6	Shale	shale			x
133		121974648700	8.6	31.3	dolomite	carbonates			
134	24	121974622200	0	1.6	Sugar Run-Romeo Trans	carbonates			
135		121974622200	1.6	23.6	Romeo Dolomite	carbonates			
136		121974622200	23.6	25	Romeo-Markgraf Trans	carbonates			
137		121974622200	25	46.6	Markgraf Dolomite	carbonates			
138		121974622200	46.6	47.9	Markgraf-Brandon Bridge Trans	carbonates			
139		121974622200	47.9	57.4	Brandon Bridge Dolomite	carbonates			
140	25	121974281100	0	57	limestone	carbonates			
141		121974281100	57	76	limestone with shale layers	Carbonates and Shale			
142		121974281100	76	127	limestone	Carbonates			
143		121974281100	127	130	shale	shale	x		
144	26	121972552500	0	60	overburden	overburden			
145		121972552500	60	120	rock formation	Carbonates			
146	27	121973976800	0	12	gravel	sand and gravel			
147		121973976800	12	110	limestone	Carbonates			
148		121973976800	110	120	limestone & shale	Carbonates and Shale			
149	28	121974053100	0	8	soil rock & clay	topsoil			
150		121974053100	8	141	limestone, flowing well	Carbonates			
151	29	121973630100	0	3	soil/clay/fill	fill			
152		121973630100	3	15	dolomite	dolomite			
153	30	121973629800	0	1	crushed limestone roadbase	fill			
154		121973629800	1	8	clay	clay			
155		121973629800	8	25	dolomite	carbonates			
156	31	121974691400	0	18	clay	clay			
157		121974691400	18	51	clay with fine gravel layers	clay, sand, gravel			
158		121974691400	51	54	coarse caving gravel	sand and gravel			
159		121974691400	54	92	clay with sand layers	clay, sand			
160		121974691400	92	98	clay	clay			
161		121974691400	98	111	limestone with fractures	Carbonates			
162		121974691400	111	131	shale	shale	x		
163		121974691400	131	240	limestone	Carbonates			x
164	32	121974121000	0	4	clay	clay			
165		121974121000	4	18	coarse gravel	sand and gravel			
166		121974121000	18	50	fine gravel	sand and gravel			
167		121974121000	50	147	limestone	Carbonates			
168		121974121000	147	155	limestone & shale mix (hard)	Carbonates and Shale			
169		121974121000	155	220	limestone	Carbonates			
170	33	121973735700	0	25	clay & boulders	clay			
171		121973735700	25	74	sand & fine gravel	sand and gravel			
172		121973735700	74	125	white limestone	Carbonates			
173		121973735700	125	150	hard gray shale	shale	x		
174		121973735700	150	205	brown & white limestone	Carbonates			x
175	34	MW-01	0	5	Fill: Black coal cinders, fine gravel, cobbles, crushed r	Fill			
176		MW-01	5	9	Gravel, weathered, limestone, silt	sand and gravel			
177		MW-01	9	19	Weathered limestone bedrock	Carbonates			
178	35	MW-02	0	7	Fill: Black coal ash, brown gravely clay, sand, gray silt	Fill			
179		MW-02	7	8.5	Fill: Rubble	Fill			
180		MW-02	8.5	12	Black coal cinders, coal dust, clay fill	Fill			
181		MW-02	12	22	Weathered limestone bedrock	Carbonates			
182	36	MW-03	0	7.5	FILL: Black coal ash, gravel, coarse sand, crushed rock	Fill			
183		MW-03	7.5	10	GC: Gray gravel, silt	sand and gravel			
184		MW-03	10	19.5	Weathered limestone bedrock	Carbonates			
185	37	MW-04	0	6	FILL: Brown fine sand, black ash, crushed rock, fine t	Fill			
186		MW-04	6	9	Gray silt, weathered limestone, moist to dry	Carbonates			
187		MW-04	9	20	Limestone bedrock, weathered	Carbonates			
188	38	MW-05	0	8	FILL: Brown silty clay, fine gravel, coarse gravel, crush	Fill			
189		MW-05	8	9	GC: Brown gravel, clay, silty, wet	clay, sand, gravel			
190		MW-05	9	20	Weathered limestone bedrock	Carbonates			
191	39	MW-06	0	8	FILL: Crushed stone, brown medium sand, black coal	Fill			
192		MW-06	8	10.5	CL: Gray silty clay, coarse to fine gravel, trace coarsM	clay, sand, gravel			
193		MW-06	10.5	18	Weathered limestone bedrock	Carbonates			
194	40	MW-07	0	3.5	FILL: Crushed stone, gravel, silt, sand	Fill			
195		MW-07	3.5	7	FILL: Rock rubble, dry	Fill			
196		MW-07	7	8.5	GC: Brown gravel, silt, coarse sand, saturated	sand and gravel			
197		MW-07	8.5	18	Weathered limestone bedrock	Carbonates			
198	41	MW-08	0	0.5	CL: Dark brown clayey silt, dry	Silt and Clay			
199		MW-08	0.5	5.5	FILL: Coarse gravel, crushed rock, dry	Fill			
200		MW-08	5.5	7	FILL: Crushed rock, silty gravel	Fill			
201		MW-08	7	19	Weathered limestone bedrock	Carbonates			

202	42	MW-09	0	5	FILL: Crushed rock, coarse sand, some silt	Fill				
203		MW-09	5	6	FILL: Some brown silty clay	Fill				
204		MW-09	6	10.5	GC: Gray silty clay, fine and coarse gravel, some coars	clay, sand, gravel				
205		MW-09	10.5	11.5	GC: Clayey gravel	clay, sand, gravel				
206		MW-09	11.5	19	Weathered limestone bedrock	Carbonates				
207	43	MW-10	0	10	FILL: Crushed Limestone, silt, gravel	Fill				
208		MW-10	10	12	GC: Weathered limestone, clay, sand, gravel	clay, sand, gravel				
209		MW-10	12	20	Weathered limestone bedrock	Carbonates				
210	44	MW-11	0	1	Roadway of sand and gravel	sand and gravel				
211		MW-11	1	2	Sand and Gravel, Dark brown, fine to medium, silty, c	sand and gravel				
212		MW-11	2	3	Clay, brown, with sand and gravel, slightly moist	clay, sand, gravel				
213		MW-11	3	7.5	Gravel, limestone/dolomite, dry to slightly moist	sand and gravel				
214		MW-11	7.5	13	Clay, dark brown and black, silty, some sand and grav	clay, sand, gravel				
215		MW-11	13	22	Weathered Bedrock, dolomite	Carbonates				
216	45	MW-12	0	1	Roadway of sand and gravel	Fill				
217		MW-12	1	2	Sand, Black, Brown, fine to medium, silty, dry	sand				
218		MW-12	2	4	Clay with Gravel, slightly moist	clay, sand, gravel				
219		MW-12	4	4	Gravel layer	sand and gravel				
220		MW-12	4	7	Clay with Gravel, slightly moist	clay, sand, gravel				
221		MW-12	7	11.5	Silty Sand, fine to medium, black, moist	sand				
222		MW-12	11.5	12	Silty sand, tan to white, fine to medium, wet	sand				
223		MW-12	12	13.5	Silty Sand, brown, medium to coarse, wet	sand				
224		MW-12	13.5	15.5	Silt and clay, dark gray, trace sand and gravel, very so	silt and clay				
225		MW-12	15.5	20	Clay, white, light greenish gray, orange mottled, mois	clay				

Attachment 9-2 – Boring Logs

PATRICK ENGINEERING INC.

BORING NUMBER **B-MW-1-Wi** SHEET **1** OF **1**
CLIENT **Midwest Generation**
PROJECT & NO. **21053.070**
LOCATION **Will County Station**

LOGGED BY **MPG**
GROUND ELEVATION **589.8**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	PL □- - -○- - -△ LL Water Content 10 20 30 40 50 / Unconfined Compressive Strength (TSF) ✱ 1 2 3 4 5	NOTES & TEST RESULTS
589.8	0.0		Black coal cinders, fine gravel, cobbles, crushed rock FILL				
				SS-1 1.0-2.5 7"R	5 10 14		qu=NT
							Bentonite seal 2.0'-8.0'. Stickup protective cover installed. qu=NT
				SS-2 3.5-5.0 10"R	4 9 15		
584.8	5.0		Gravel, weathered limestone, silt				
583.8	6.0		▽ Saturated	SS-3 6.0-7.5 12"R	7 21 19		qu=NT
							Sand pack 8.0'-19.0'
			Weathered limestone bedrock	SS-4 8.5-10.0	50/4"		Set screen (slot 0.010") 9.0'-19.0'
579.8	10.0		End of Boring at 10.0'				
570.8	19.0						

DRILLING CONTRACTOR **Groff Testing**
DRILLING METHOD **4.25" I.D. HSA**
DRILLING EQUIPMENT **CME 550 ATV**
DRILLING STARTED **10/22/10** ENDED **10/25/10**

REMARKS
Installed 2" diameter PVC monitoring well.

WATER LEVEL (ft.)
▽ **6.0**
▼
▼

PATRICK ENGINEERING INC.

BORING NUMBER **B-MW-2-Wi** SHEET **1** OF **1**
CLIENT **Midwest Generation**
PROJECT & NO. **21053.070**
LOCATION **Will County Station**

LOGGED BY **MPG**
GROUND ELEVATION **590.6**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	PL □- - -○- - -△ LL Water Content 10 20 30 40 50 / Unconfined Compressive Strength (TSF) ✳ 1 2 3 4 5	NOTES & TEST RESULTS
590.6	0.0		Black coal ash, brown gravely clay, sand, gray silty clay FILL				
				SS-1 1.0-2.5			Bentonite seal 2.0'-10.0'. Stickup protective cover installed.
				SS-2 3.5-5.0 6"R	9 13 10		qu=NT
			Rubble	SS-3 6.0-7.5 18"R	6 7 9		qu=NT
582.1	8.5		Black coal cinders, coal dust, clay fill	SS-4 8.5-10.0 16"R	5 7 7		qu=NT
580.6	10.0		∇ Wet				Sand pack 10.0'-22.0'
				SS-5 11.0-12.5	9 50/0"		qu=NT
578.6	12.0		Weathered limestone bedrock End of Boring at 12.0'				Set screen (slot 0.010") 12.0'-22.0' Cored bedrock to 22.0'
568.6	22.0						

DRILLING CONTRACTOR **Groff Testing**
DRILLING METHOD **4.25" I.D. HSA**
DRILLING EQUIPMENT **CME 550 ATV**
DRILLING STARTED **10/21/10** ENDED **10/22/10**

REMARKS
Installed 2" diameter PVC monitoring well.

WATER LEVEL (ft.)
∇ **10.0**
∇
▼

PATRICK ENGINEERING INC.

BORING NUMBER **B-MW-3-Wi** SHEET **1** OF **1**
CLIENT **Midwest Generation**
PROJECT & NO. **21053.070**
LOCATION **Will County Station**

LOGGED BY **MPG**
GROUND ELEVATION **590.5**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL □- - -○- - -△ LL 10 20 30 40 50 / Unconfined Compressive Strength (TSF) ✳ 1 2 3 4 5	NOTES & TEST RESULTS
590.5	0.0		Black coal ash, gravel, coarse sand, crushed rock, limestone, rubble FILL				
				SS-1 1.0-2.5 15"R	10 10 12		qu=NT
							Bentonite seal 2.0'-6.5'. Stickup protective cover installed.
			Dry	SS-2 3.5-5.0 13"R	6 10 18		qu=NT
				SS-3 6.0-7.5 14"R	7 15 21		qu=NT Sand pack 6.5'-19.5' Set screen (slot 0.010") 7.0'-17.0'
583.5	7.0		▼				
583.0	7.5						
582.5	8.0		▽ Gray gravel, silt GC Wet				
				SS-4 8.5-10.0 4"R	3 50/0"		qu=NT
580.5	10.0		Weathered limestone bedrock End of Boring at 10.0'				Cored bedrock to 19.5'
571.0	19.5						

DRILLING CONTRACTOR **Groff Testing**
DRILLING METHOD **4.25" I.D. HSA**
DRILLING EQUIPMENT **CME 550 ATV**
DRILLING STARTED **10/20/10** ENDED **10/24/10**

REMARKS
Installed 2" diameter PVC monitoring well.

WATER LEVEL (ft.)
▽ **8.0**
▼ **7.0**
▼

PATRICK ENGINEERING INC.

BORING NUMBER **B-MW-4-Wi** SHEET **1** OF **1**
CLIENT **Midwest Generation**
PROJECT & NO. **21053.070**
LOCATION **Will County Station**

LOGGED BY **MPG**
GROUND ELEVATION **591.2**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	PL □ Water Content ○ LL △ (10 20 30 40 50) / Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)	NOTES & TEST RESULTS
591.2	0.0		Brown fine sand, black ash, crushed rock, fine to coarse gravel, ddry FILL				
				SS-1 1.0-2.5 14"R	9 14 17		qu=NT Bentonite seal 2.0'-8.5'. Stickup protective cover installed.
				SS-2 3.5-5.0 6"R	16 50/3"		qu=NT
585.2	6.0		Gray silt, weathered limestone, moist to wet	SS-3 6.0-7.5 16"R	4 23 27		qu=NT
				SS-4 8.5-10.0 1"R	50/2"		qu=NT Sand pack 8.5'-19.5' Set screen (slot 0.010") 9.5'-19.5'
582.2	9.0		▽ Saturated Limestone bedrock, weathered				
571.2	20.0		End of Boring at 20.0'				

DRILLING CONTRACTOR **Groff Testing**
DRILLING METHOD **4.25" I.D. HSA**
DRILLING EQUIPMENT **CME 550 ATV**
DRILLING STARTED **10/18/10** ENDED **10/19/10**

REMARKS
Installed 2" diameter PVC monitoring well.

WATER LEVEL (ft.)
▽ **9.0**
▽
▼

PATRICK ENGINEERING INC.

BORING NUMBER **B-MW-5-Wi** SHEET **1** OF **1**
CLIENT **Midwest Generation**
PROJECT & NO. **21053.070**
LOCATION **Will County Station**

LOGGED BY **MPG**
GROUND ELEVATION **589.6**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL □- - -○- - -△ LL 10 20 30 40 50 Unconfined Compressive Strength (TSF) ✳ 1 2 3 4 5	NOTES & TEST RESULTS
589.6	0.0		Brown silty clay, fine gravel, coarse gravel, crushed limestone FILL				
				SS-1 1.0-2.5 14"R	4 6 10		qu=NT Bentonite seal 2.0'-8.0'. Stickup protective cover installed.
			Dry	SS-2 3.5-5.0 14"R	7 10 21		qu=NT
				SS-3 6.0-7.5 10"R	10 11 15		qu=NT
581.6	8.0						Sand pack 8.0'-19.0'
581.1	8.5		▽ Brown gravel, clay, silt, wet GC	SS-4 8.5-10.0 4"R	8 50/0"		qu=NT Set screen (slot 0.010") 9.0'-19.0'
580.6	9.0		Weathered limestone bedrock				
569.6	20.0						
			End of Boring at 20.0'				

DRILLING CONTRACTOR **Groff Testing**
DRILLING METHOD **4.25" I.D. HSA**
DRILLING EQUIPMENT **CME 550 ATV**
DRILLING STARTED **10/20/10** ENDED **10/20/10**

REMARKS
Installed 2" diameter PVC monitoring well.

WATER LEVEL (ft.)
▽ **8.5**
▼
▼

PATRICK ENGINEERING INC.

BORING NUMBER **B-MW-6-Wi** SHEET **1** OF **1**
CLIENT **Midwest Generation**
PROJECT & NO. **21053.070**
LOCATION **Will County Station**

LOGGED BY **MPG**
GROUND ELEVATION **589.8**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL □---○---△ LL 10 20 30 40 50 Unconfined Compressive Strength (TSF) ✳ 1 2 3 4 5	NOTES & TEST RESULTS
589.8	0.0	▩	Crushed stone, brown medium sand, black coal cinders, dry FILL				
		▩		SS-1 1.0-2.5 10"R	7 11 8		qu=NT
		▩		SS-2 3.5-5.0 10"R	6 14 13		Bentonite seal 3.0'-8.0'. Stickup protective cover installed. qu=NT
		▩		SS-3 6.0-7.5 11"R	4 7 16		qu=NT
581.8	8.0	▨	Gray silty clay, coarse to fine gravel, trace coarse sand, wet CL				
580.8	9.0	▨	∇	SS-4 8.5-10.0 12"R	7 9 18		Set screen (slot 0.010") 8.0'-18.0' Sand pack 8.0'-18.0' qu=NT
579.3	10.5	▦	Weathered limestone bedrock				Set up NX core barrel & cored bedrock to 18.0'
571.8	18.0		End of Boring at 18.0'				

DRILLING CONTRACTOR **Groff Testing**
DRILLING METHOD **4.25" I.D. HSA**
DRILLING EQUIPMENT **CME 550 ATV**
DRILLING STARTED **10/12/10** ENDED **10/12/10**

REMARKS
Installed 2" diameter PVC monitoring well.

WATER LEVEL (ft.)
∇ **9.0**
∇
▼

PATRICK ENGINEERING INC.

BORING NUMBER **B-MW-7-WI** SHEET **1** OF **1**
CLIENT **Midwest Generation**
PROJECT & NO. **21053.070**
LOCATION **Will County Station**

LOGGED BY **MPG**
GROUND ELEVATION **589.6**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	PL □ – – ○ – – △ LL Water Content 10 20 30 40 50 Unconfined Compressive Strength (TSF) ✳ 1 2 3 4 5	NOTES & TEST RESULTS
589.6	0.0		Crushed stone, gravel, silt, sand FILL				
				SS-1 1.0-2.5 10"R	7 7 4		qu=NT
			Rock rubble, dry				Bentonite seal 3.0'-6.0'. Stickup protective cover installed.
				SS-2 3.5-5.0 10"R	6 11 12		qu=NT
				SS-3 6.0-7.5 6"R	11 5 5		qu=NT Sand pack 6.0'-18.0'
582.6	7.0		Brown gravel, silt, coarse sand, saturated GC				
581.6	8.0		∇				Set screen (slot 0.010") 7.5'-17.5'
581.1	8.5		Weathered limestone bedrock	SS-4 8.5-10.0 0"R	50/2"		qu=NT Cored bedrock 9.0'-18.0'
571.6	18.0		End of Boring at 18.0'				

DRILLING CONTRACTOR **Groff Testing**
DRILLING METHOD **4.25" I.D. HSA**
DRILLING EQUIPMENT **CME 550 ATV**
DRILLING STARTED **10/22/10** ENDED **10/22/10**

REMARKS
Installed 2" diameter PVC monitoring well.

WATER LEVEL (ft.)
∇ **8.0**
∇
∇

PATRICK ENGINEERING INC.

BORING NUMBER **B-MW-8-Wi** SHEET **1** OF **1**
CLIENT **Midwest Generation**
PROJECT & NO. **21053.070**
LOCATION **Will County Station**

LOGGED BY **MPG**
GROUND ELEVATION **589.6**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	PL □- - -○- - -△ LL Water Content 10 20 30 40 50 / Unconfined Compressive Strength (TSF) ✳ 1 2 3 4 5	NOTES & TEST RESULTS
589.6 589.1	0.0 0.5		Dark brown clayey silt, dry CL				
			Coarse gravel, crushed rock, dry FILL	SS-1 1.0-2.5 6"R	4 7 9		qu=NT
				SS-2 3.5-5.0 10"R	5 13 10		Bentonite seal 3.0'-6.0'. Stickup protective cover installed. qu=NT
			Crushed rock, silty gravel	SS-3 6.0-7.5 10"R	7 19 22		qu=NT
582.6	7.0		Moist				Sand pack 7.0'-19.0'
			Weathered limestone bedrock	SS-4 8.5-10.0 4"R	10 50/1"		qu=NT Set screen (slot 0.010") 9.0'-19.0'
570.6	19.0		End of Boring at 19.0'				

DRILLING CONTRACTOR **Groff Testing**
DRILLING METHOD **4.25" I.D. HSA**
DRILLING EQUIPMENT **CME 550 ATV**
DRILLING STARTED **10/19/10** ENDED **10/19/10**

REMARKS
Installed 2" diameter PVC monitoring well.

WATER LEVEL (ft.)
▽
▽
▽

PATRICK ENGINEERING INC.

BORING NUMBER **B-MW-9-Wi** SHEET **1** OF **1**
CLIENT **Midwest Generation**
PROJECT & NO. **21053.070**
LOCATION **Will County Station**

LOGGED BY **MPG**
GROUND ELEVATION **589.8**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	PL □– – –○– – –△ LL Water Content 10 20 30 40 50 Unconfined Compressive Strength (TSF) ✳ 1 2 3 4 5	NOTES & TEST RESULTS
589.8	0.0		Crushed rock, coarse sand, some silt FILL				
				SS-1 1.0-2.5 14"R	4 7 9		qu=NT
				SS-2 3.5-5.0 16"R	3 11 6		Bentonite seal 3.0'-8.0'. Stickup protective cover installed. qu=NT
			Some brown silty clay				
583.8	6.0		Gray silty clay, fine and coarse gravel, some coarse sand GC	SS-3 6.0-7.5 16"R	4 11 13		qu=NT
							Sand pack 8.0'-19.0'
			Moist	SS-4 8.5-10.0 17"R	4 10 11		qu=NT Set screen (slot 0.010") 9.0'-19.0'
			Clayey gravel				
578.3	11.5		Weather limestone bedrock	SS-5 11.0-12.5 12"R	5 5 50/3"		qu=NT Cored bedrock to 22.0'
570.8	19.0		End of Boring at 19.0'				

DRILLING CONTRACTOR **Groff Testing**
DRILLING METHOD **4.25" I.D. HSA**
DRILLING EQUIPMENT **CME 550 ATV**
DRILLING STARTED **10/19/10** ENDED **10/19/10**

REMARKS
Installed 2" diameter PVC monitoring well.

WATER LEVEL (ft.)
∇ **11.5'**
∇
▼

PATRICK ENGINEERING INC.

BORING NUMBER **B-MW-10-Wi** SHEET **1** OF **1**
CLIENT **Midwest Generation**
PROJECT & NO. **21053.070**
LOCATION **Will County Station**

LOGGED BY **MPG**
GROUND ELEVATION **591.3**

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	PL Water Content LL 10 20 30 40 50 Unconfined Compressive Strength (TSF) ✳ 1 2 3 4 5	NOTES & TEST RESULTS
591.3	0.0		Crushed limestone, silt, gravel FILL				
				SS-1 1.0-2.5 4"R	7 10 12		Bentonite seal 2.0'-8.0'. Flush mount protective cover installed.
				SS-2 3.5-5.0 14"R	13 18 8		qu=NT
				SS-3 6.0-7.5 4"R	18 50/5"		qu=NT
				SS-4 8.5-10.0 4"R	13 17 50/1"		Sand pack 8.0'-20.0' qu=NT
581.3	10.0	▽	Weathered limestone, clay, sand, gravel GC				
				SS-5 11.0-12.5 0"R	17 50/0"		Set screen (slot 0.010") (slot 0.010") 10.0'-20.0' qu=NT -21.0'
579.3	12.0		Weathered limestone bedrock				
571.3	20.0		End of Boring at 20.0'				

DRILLING CONTRACTOR **Groff Testing**
DRILLING METHOD **4.25" I.D. HSA**
DRILLING EQUIPMENT **CME 550 ATV**
DRILLING STARTED **10/21/10** ENDED **10/21/10**

REMARKS
Installed 2" diameter PVC monitoring well.

WATER LEVEL (ft.)
▽ **10.0**
▼
▼

KPRG
ENVIRONMENTAL CONSULTATION & REMEDIATION
KPRG and Associates, Inc.

Midwest Generation, LLC
Will County Station
Romeoville, Illinois

Project No. 12313

GEOLOGIC LOG OF MW-11

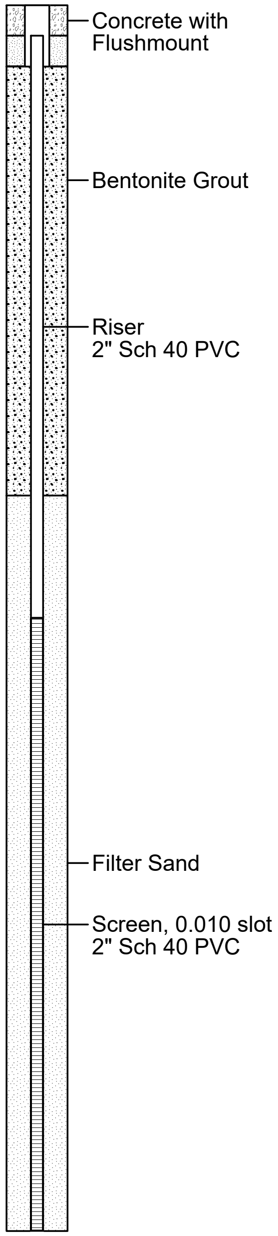
(Page 1 of 2)

Date Started : 09/14/15
Date Well Set : 09/14/15
Drilling Tools : 8 1/4 HSA
Reaming Tools : None
Drill Rig : Deitrich D-120
Driller Name/Co : J. Luna / Earth Solutions

Total Boring Depth : 28.0 feet
Well Bottom Depth : 20.0 feet
Surface Elev. : 591.09 feet above MSL
TOC Elev. : 590.69 feet above MSL
Groundwater Elev. : xxx feet above MSL
Riser Material : 2" Sch 40 PVC
Screen Material : 2" Sch 40 PVC, 0.010 slot
Coordinate N :
Coordinate E :
Logged By : P. Allenstein

Depth in Feet	Surf. Elev. 591.09	DESCRIPTION	% RQD	% Recovery
0	591	Roadway of Sand and Gravel, dry.		
1	590	SAND and GRAVEL, Dark Brown, fine to medium, silty, dry		
2	589	CLAY, brown, with sand and gravel, slightly moist.		
3	588	GRAVEL, limestone/dolomite, dry to slightly moist.		
4	587			
5	586	- some sand		
6	585			
7	584			
8	583	CLAY, dark brown and black, slity, some sand and gravel, moist.		
9	582			
10	581			
11	580			
12	579			
13	578	Weathered Bedrock, dolomite.		
14	577			
15	576			
16	575			
17	574			
18	573			
19	572			
20	571			
21	570			
22				

Well Diagram:



GEOLOGIC LOG OF MW-11

(Page 2 of 2)

Midwest Generation, LLC
Will County Station
Romeoville, Illinois

Project No. 12313

Date Started : 09/14/15
Date Well Set : 09/14/15
Drilling Tools : 8 1/4 HSA
Reaming Tools : None
Drill Rig : Deitrich D-120
Driller Name/Co : J. Luna / Earth Solutions

Total Boring Depth : 28.0 feet
Well Bottom Depth : 20.0 feet
Surface Elev. : 591.09 feet above MSL
TOC Elev. : 590.69 feet above MSL
Groundwater Elev. : xxx feet above MSL
Riser Material : 2" Sch 40 PVC
Screen Material : 2" Sch 40 PVC, 0.010 slot
Coordinate N :
Coordinate E :
Logged By : P. Allenstein

Depth in Feet	Surf. Elev. 591.09	DESCRIPTION	% RQD	% Recovery
22	569			
23	568			
24	567			
25	566			
26	565			
27	564			
28	563	End of Boring at 28 feet.		
29	562			
30	561			
31	560			
32	559			
33	558			
34	557			
35	556			
36	555			
37	554			
38	553			
39	552			
40	551			
41	550			
42	549			
43	548			
44				

Well Diagram:

KPRG
ENVIRONMENTAL CONSULTATION & REMEDIATION
KPRG and Associates, Inc.

GEOLOGIC LOG OF MW-12

(Page 1 of 1)

Midwest Generation, LLC
Will County Station
Romeoville, Illinois

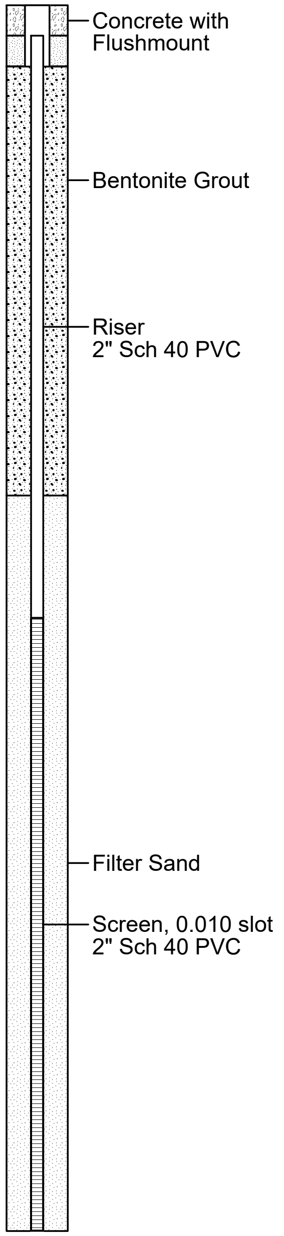
Project No. 12313

Date Started	: 09/15/15
Date Well Set	: 09/15/15
Drilling Tools	: 8 1/4 HSA
Reaming Tools	: None
Drill Rig	: Deitrich D-120
Driller Name/Co	: J. Luna / Earth Solutions

Total Boring Depth	: 20.0 feet
Well Bottom Depth	: 20.0 feet
Surface Elev.	: 591.23 feet above MSL
TOC Elev.	: 590.81 feet above MSL
Groundwater Elev.	: xxx feet above MSL
Riser Material	: 2" Sch 40 PVC
Screen Material	: 2" Sch 40 PVC, 0.010 slot
Coordinate N	:
Coordinate E	:
Logged By	: P. Allenstein

Depth in Feet	Surf. Elev. 591.23	DESCRIPTION	% RQD	% Recovery
0	591	Roadway of Sand and Gravel, dry.		
1	590	SAND, Black, Brown, fine to medium, silty, dry		
2	589	CLAY, with GRAVEL, slightly moist.		
3	588			
4	587	- gravel layer		
5	586			
6	585			
7	584	SILTY SAND, fine to medium, black, moist.		
8	583			
9	582			
10	581			
11	580	SILTY SAND, tan to white, fine to medium, wet.		
12	579	SILTY SAND, brown, medium to coarse, wet.		
13	578			
14	577	SILT and CLAY, dark gray, trace sand and gravel, very soft wet.		
15	576			
16	575	CLAY, white, light greenish gray, orange mottled, moist.		
17	574			
18	573			
19	572			
20	571	End of Boring at 20 feet.		
21	570			
22				

Well Diagram:



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GEOLOGIC LOG OF MW-13

(Page 1 of 1)

Midwest Generation, LLC
Will County Station
Romeoville, Illinois

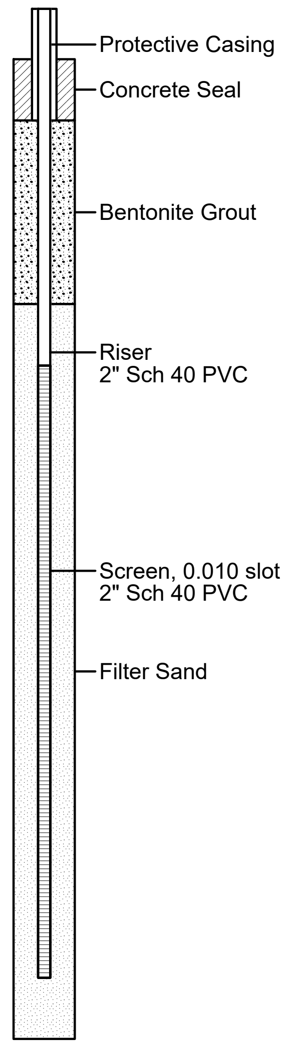
Project No. 12313

Date Started : 04/12/21
Date Well Set : 04/13/21
Drilling Tools : 8 1/4 HSA
Reaming Tools : None
Drill Rig : Deitrich D-120
Driller Name/Co : J. Luna / Earth Solutions

Total Boring Depth : 16.0 feet
Well Bottom Depth : 15.0 feet
Surface Elev. : 589.45 feet above MSL
TOC Elev. : 592.80 feet above MSL
Groundwater Elev. : xxx feet above MSL
Riser Material : 2" Sch 40 PVC
Screen Material : 2" Sch 40 PVC, 0.010 slot
Coordinate N :
Coordinate E :
Logged By : E. Bulson

Depth in Feet	Surf. Elev. 589.45	DESCRIPTION	% RQD	% Recovery
0	589.45	Brown/Tan SILTY SAND with Clay and Gravel, slightly moist. Some black cinders.		
1	588.45	Gray/Brown SILTY SAND and Gravel, trace clay, slightly moist.		
2	587.45	Tan fine SAND and GRAVEL, slightly moist.		
3	586.45			
4	585.45			
5	584.45			
6	583.45			
7	582.45			
8	581.45			
9	580.45			
10	579.45	White DOLOMITE bedrock, fractured.		
11	578.45			
12	577.45			
13	576.45			
14	575.45			
15	574.45			
16	573.45			
17	572.45	End of Boring at 16 feet.		
18	571.45			
19	570.45			
20	569.45			
21	568.45			
22				

Well Diagram:



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GEOLOGIC LOG OF MW-14
(Page 1 of 1)

Midwest Generation, LLC
Will County Station
Romeoville, Illinois

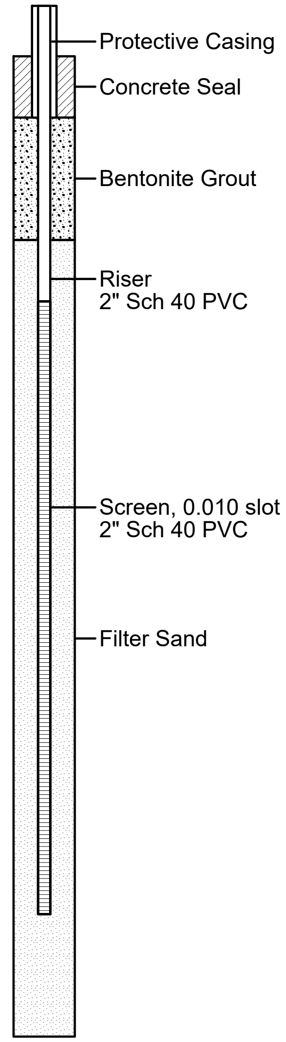
Project No. 12313

Date Started	: 04/12/21
Date Well Set	: 04/12/21
Drilling Tools	: 8 1/4 HSA
Reaming Tools	: None
Drill Rig	: Deitrich D-120
Driller Name/Co	: J. Luna / Earth Solutions

Total Boring Depth	: 16.0 feet
Well Bottom Depth	: 15.0 feet
Surface Elev.	: 589.45 feet above MSL
TOC Elev.	: 592.80 feet above MSL
Groundwater Elev.	: xxx feet above MSL
Riser Material	: 2" Sch 40 PVC
Screen Material	: 2" Sch 40 PVC, 0.010 slot
Coordinate N	:
Coordinate E	:
Logged By	: E. Bulson

Depth in Feet	Surf. Elev. 589.85	DESCRIPTION	% RQD	% Recovery
0	589.85	Brown COBBLES, Black SILTY SAND, slightly moist.		
1	588.85	Black SILTY SAND, trace road GRAVEL, trace CLAY, slightly moist.		
2	587.85			
3	586.85			
4	585.85			
5	584.85	increase GRAVEL		
6	583.85			
7	582.85			
8	581.85	increase SAND		
9	580.85			
10	579.85			
11	578.85			
12	577.85	White DOLOMITE bedrock.		
13	576.85			
14	575.85			
15	574.85			
16	573.85			
17	572.85	End of Boring at 16 feet.		
18	571.85			
19	570.85			
20	569.85			
21	568.85			
22				

Well Diagram:



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Midwest Generation, LLC
Will County Station
Romeoville, Illinois

Project No. 12313

GEOLOGIC LOG OF MW-15

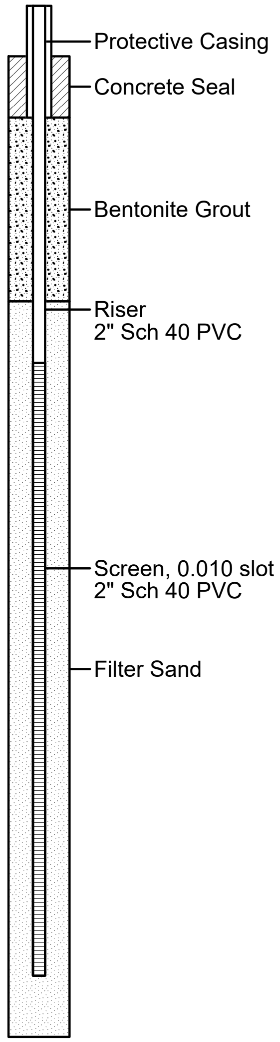
(Page 1 of 1)

Date Started	: 04/13/21
Date Well Set	: 04/13/21
Drilling Tools	: 8 1/4 HSA
Reaming Tools	: None
Drill Rig	: Deitrich D-120
Driller Name/Co	: J. Luna / Earth Solutions

Total Boring Depth	: 16.0 feet
Well Bottom Depth	: 15.0 feet
Surface Elev.	: 590.14 feet above MSL
TOC Elev.	: 592.89 feet above MSL
Groundwater Elev.	: xxx feet above MSL
Riser Material	: 2" Sch 40 PVC
Screen Material	: 2" Sch 40 PVC, 0.010 slot
Coordinate N	:
Coordinate E	:
Logged By	: E. Bulson

Depth in Feet	Surf. Elev. 590.14	DESCRIPTION	% RQD	% Recovery
0	590.14	Black and Dark Brown SILTY SAND, some COBBLES, slightly moist.		
1	589.14			
2	588.14			
3	587.14			
4	586.14	White and Tan GRAVEL.		
5	585.14			
6	584.14	Black SILTY CLAY with Red brick pieces, moist.		
7	583.14			
8	582.14	Wet at 8 feet.		
9	581.14	Weathered BEDROCK and Gray SILTY CLAY.		
10	580.14			
11	579.14			
12	578.14	Tan DOLOMITE, cherty.		
13	577.14			
14	576.14			
15	575.14			
16	574.14			
17	573.14	End of Boring at 16 feet.		
18	572.14			
19	571.14			
20	570.14			
21	569.14			
22				

Well Diagram:



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Attachment 9-3 – Historical CCA Groundwater Data

Attachment 9-3. Table. CCA Groundwater Analytical Results - Midwest Generation LLC, Will County Station, Romeoville, IL

Sample: MW-01	Date	12/13/2010		3/28/2011		6/15/2011		9/15/2011		12/8/2011		3/16/2012		6/20/2012		9/24/2012		12/18/2012	
Parameter	Standards	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result
Antimony	0.006	0.0030	ND^	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	0.0063	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND
Arsenic	0.010	0.0010	ND	0.0010	ND	0.0050	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND
Barium	2.0	0.0025	0.050	0.0025	0.041	0.0025	0.046	0.0025	0.038	0.0025	0.033	0.0025	0.033	0.0025	0.039	0.0025	0.035	0.0025	0.034
Beryllium	0.004	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND
Boron	2.0	0.25	1.8	0.050	1.6	0.050	1.8	0.050	1.7	0.050	1.6	0.25	1.5	0.50	2.1	0.25	1.9	0.50	1.9
Cadmium	0.005	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Chloride	200.0	10	110	10	210	10	110	10	120	10	140	10	190	10	170	10	120	10	160
Chromium	0.1	0.0050	ND	0.0050	ND	0.025	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND
Cobalt	1.0	0.0010	0.0011	0.0010	ND	0.0050	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND
Copper	0.65	0.0020	ND	0.0020	ND	0.010	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Cyanide	0.2	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND
Fluoride	4.0	0.10	0.71	0.10	0.65	0.10	0.53	0.10	0.77	0.10	0.73	0.10	0.69	0.10	0.77	0.10	0.86	0.10	0.86 ^
Iron	5.0	0.10	ND	0.10	ND	0.50	ND	0.10	0.11	0.10	0.11	0.10	ND	0.10	0.23	0.10	0.33	0.10	0.20
Lead	0.0075	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Manganese	0.15	0.0025	0.20	0.0025	0.15	0.013	0.22	0.0025	0.16	0.0025	0.17	0.0025	0.16	0.0025	0.16	0.0025	0.15	0.0025	0.18
Mercury	0.002	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND
Nickel	0.1	0.0020	0.0046	0.0020	0.0038	0.010	ND	0.0020	0.0029	0.0020	0.0040	0.0020	0.0042	0.0020	0.0041	0.0020	0.0043	0.0020	0.0052
Nitrogen/Nitrate	10.0	0.10	ND	0.10	1.1	0.10	0.73	0.10	0.33	0.10	1.4	0.10	2.2	0.10	0.61	0.10	0.25	0.10	1.5
Nitrogen/Nitrate, Nit	NA	0.10	ND	0.10	1.1	0.10	0.73	0.10	0.37	0.10	1.4	0.20	2.2	0.10	0.61	0.10	0.25	0.10	1.5
Nitrogen/Nitrite	NA	0.020	ND	0.020	ND	0.020	ND	0.020	0.042	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND
Perchlorate	0.0049	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.004	ND
Selenium	0.05	0.0025	ND	0.0025	ND	0.013	ND	0.0025	0.0053	0.0025	0.0025	0.0025	0.0033	0.0025	0.0040	0.0025	ND	0.0025	ND
Silver	0.05	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Sulfate	400.0	100	530	100	390	100	280	50	320	100	270	100	430	100	390	100	390	100	290
Thallium	0.002	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Total Dissolved Solic	1,200	10	1100	10	1100	10	1100	10	760	10	770	10	910	10	950	10	790	10	880
Vanadium	0.049	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.0050	ND
Zinc	5.0	0.020	ND	0.020	ND	0.10	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	0.040	0.020	ND
Benzene	0.005	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.0005	ND
BETX	11.705	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.0025	ND
pH	6.5 - 9.0	NA	7.89	NA	8.05	NA	7.28	NA	7.57	NA	7.16	NA	7.84	NA	7.55	NA	7.70	NA	7.79
Temperature	NA	NA	16.28	NA	10.74	NA	14.96	NA	21.42	NA	14.57	NA	12.34	NA	18.50	NA	22.35	NA	14.65
Conductivity	NA	NA	1.70	NA	1.76	NA	1.55	NA	1.01	NA	1.00	NA	1.06	NA	1.24	NA	1.15	NA	1.14
Dissolved Oxygen	NA	NA	NM	NA	0.34	NA	0.07	NA	0.06	NA	0.06	NA	0.11	NA	0.13	NA	0.09	NA	0.06
ORP	NA	NA	NM	NA	-174.1	NA	49.2	NA	-306	NA	-108	NA	-63	NA	-98	NA	-128	NA	-103

Sample: MW-01	3/5/2013		5/23/2013		8/14/2013		10/29/2013		2/20/2014		5/20/2014		8/13/2014		10/21/2014		2/4/2015	
Parameter	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result
Antimony	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND
Arsenic	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	0.0011	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND
Barium	0.0025	0.034	0.0025	0.035	0.0025	0.090	0.0025	0.10	0.0025	0.085	0.0025	0.054	0.0025	0.064	0.0025	0.077	0.0025	0.066
Beryllium	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND^	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND
Boron	0.50	1.9	0.50	2.4	0.50	2.3	0.10	2.6	0.25	2.4	0.50	2.5	0.10	1.2	0.050	0.96	1.0	ND
Cadmium	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Chloride	10	220	10	190	10	120	10	160	10	120	10	87	2.0	35	2.0	29	2.0	30
Chromium	0.0050	0.035	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND
Cobalt	0.0010	0.0017	0.0010	ND	0.0010	0.0016	0.0010	0.0022	0.0010	0.0017	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND
Copper	0.0020	0.0026	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Cyanide	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND
Fluoride	0.10	0.77 ^	0.10	0.94	0.10	0.50	0.10	0.41	0.10	0.39	0.10	0.48	0.10	0.50	0.10	0.52	0.10	0.59
Iron	0.10	0.42	0.10	0.46	0.10	0.72	0.10	1.2	0.10	0.34	0.10	0.46	0.10	0.19	0.10	0.16	0.10	ND
Lead	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Manganese	0.0025	0.17	0.0025	0.13	0.0025	0.22	0.0025	0.28	0.0025	0.30	0.0025	0.26	0.0025	0.24	0.0025	0.17	0.0025	0.079
Mercury	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND
Nickel	0.0020	0.054	0.0020	0.0069	0.0020	0.0047	0.0020	0.0055	0.0020	0.0058	0.0020	0.0050	0.0020	0.0025	0.0020	ND	0.0020	ND
Nitrogen/Nitrate	0.10	1.6	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	0.27
Nitrogen/Nitrate, Nit	0.10	1.6	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	0.27
Nitrogen/Nitrite	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND
Perchlorate	0.004	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND
Selenium	0.0025	0.0042	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	0.0028	0.0025	0.0051
Silver	0.00050	ND	0.00050	ND	0.00050	ND ^	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Sulfate	100	310	100	460	130	540	100	430	100	390	100	230	25	91	25	150	25	99
Thallium	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Total Dissolved Solic	10	930	10	1100	10	1300	10	1300	10	1300	10	890	10	600	10	600	10	570
Vanadium	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND
Zinc	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND
Benzene	0.0005	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.0005	ND	0.0005	ND
BETX	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	0.00059	0.0025	ND	0.0025	ND
pH	NA	8.41	NA	7.56	NA	7.18	NA	7.04	NA	8.96	NA	7.19	NA	6.91	NA	7.12	NA	7.41
Temperature	NA	9.90	NA	14.40	NA	16.82	NA	16.20	NA	11.29	NA	17.77	NA	20.79	NA	17.29	NA	12.62
Conductivity	NA	1.16	NA	1.25	NA	1.51	NA	1.53	NA	1.27	NA	1.50	NA	0.95	NA	0.90	NA	0.64
Dissolved Oxygen	NA	0.20	NA	0.50	NA	0.26	NA	0.57	NA	1.11	NA	0.42	NA	0.50	NA	0.45	NA	1.07
ORP	NA	-112.3	NA	-157.5	NA	-81.4	NA	-132.6	NA	-180.6	NA	-9.7	NA	-60.4	NA	-64.4	NA	-8.3

Sample: MW-01	4/30/2015		7/27/2015		11/9/2015		2/18/2016		5/26/2016		8/11/2016		10/27/2016		2/2/2017		5/10/2017	
Parameter	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result
Antimony	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND ^	0.0030	ND
Arsenic	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0020	ND	0.0010	ND
Barium	0.0025	0.069	0.0025	0.076	0.0025	0.078	0.0025	0.075	0.0025	0.075	0.0025	0.10	0.0025	0.095	0.0025	0.082	0.0025	0.078
Beryllium	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND^	0.0010	ND	0.0010	ND
Boron	0.25	0.81	0.050	0.91	0.050	0.73	0.050	0.80	0.050	0.74	0.25	0.87	0.050	0.76	0.50	0.69	0.25	1.1
Cadmium	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Chloride	2.0	28	2.0	33	2.0	26	2.0	27	2.0	25	2.0	26	2.0	24	2.0	33	2.0	50
Chromium	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND
Cobalt	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND
Copper	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Cyanide	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND
Fluoride	0.10	0.59	0.10	0.66	0.10	0.80	0.10	0.73	0.10	0.72	0.10	0.82	0.10	0.89	0.10	0.79	0.10	0.59
Iron	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND
Lead	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Manganese	0.0025	0.011	0.0025	0.15	0.0025	0.088	0.0025	0.0087	0.0025	0.0082	0.0025	0.075 B	0.0025	0.074	0.0025	0.025	0.0025	0.032
Mercury	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	0.00020	0.00020	ND	0.00020	ND ^	0.00020	ND
Nickel	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	0.0021	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	0.0023
Nitrogen/Nitrate	0.10	0.25	0.10	0.19	0.10	0.15	0.10	0.37	0.10	0.40	0.10	0.12	0.10	ND	0.10	0.58	0.10	ND
Nitrogen/Nitrate, Nit	0.10	0.25	0.10	0.19	0.10	0.15	0.10	0.37	0.10	0.40	0.10	0.12	0.10	ND	0.10	0.58	0.10	ND
Nitrogen/Nitrite	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND
Perchlorate	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND
Selenium	0.0025	0.0053 ^	0.0025	0.0027	0.0025	0.0028	0.0025	0.0032	0.0025	0.0039	0.0025	0.0026	0.0025	ND	0.0050	ND	0.0025	ND
Silver	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Sulfate	50	100	25	120	25	110	50	120	25	110	25	80	20	97	25	90	50	140
Thallium	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Total Dissolved Solic	10	510	10	570	10	470	10	530	10	530	10	510	10	480	10	590	10	650
Vanadium	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND
Zinc	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND ^	0.020	ND
Benzene	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
BETX	0.0025	ND	0.0025	ND	0.0025	0.0013	0.0025	ND	0.0025	0.0012	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND
pH	NA	7.36	NA	7.44	NA	7.25	NA	7.17	NA	7.12	NA	7.07	NA	7.45	NA	7.22	NA	7.67
Temperature	NA	12.63	NA	21.71	NA	17.51	NA	10.73	NA	20.50	NA	23.50	NA	15.04	NA	11.20	NA	13.67
Conductivity	NA	0.697	NA	0.858	NA	0.687	NA	0.53	NA	0.80	NA	0.82	NA	0.64	NA	0.64	NA	0.69
Dissolved Oxygen	NA	2.32	NA	1.39	NA	0.62	NA	2.08	NA	2.02	NA	1.51	NA	2.53	NA	1.10	NA	2.86
ORP	NA	31.7	NA	-122.9	NA	-0.6	NA	-43.8	NA	-18.5	NA	-126.9	NA	-62.6	NA	-5.5	NA	148.7

Sample: MW-01	9/8/2017		11/15/2017		2/28/2018		5/2/2018		7/24/2018		10/4/2018		2/19/2019		5/28/2019		8/21/2019	
Parameter	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result
Antimony	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND
Arsenic	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND
Barium	0.0025	0.087	0.0025	0.089	0.0025	0.089	0.0025	0.079	0.0025	0.096	0.0025	0.092	0.0025	0.082	0.0025	0.081	0.0025	0.13
Beryllium	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND ^
Boron	0.05	0.73	0.05	0.74	0.05	0.74	0.05	0.75	0.25	0.9	0.05	0.7	0.05	0.57	0.05	0.9	0.05	1.7
Cadmium	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Chloride	2	27	2	26	2	26	2	29	2	29	2	28	2	59	2	64	2	31
Chromium	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND
Cobalt	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND
Copper	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND
Cyanide	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND
Fluoride	0.1	0.90 F1	0.1	0.93	0.1	0.93	0.1	0.85	0.1	0.89	0.1	1	0.1	0.82	0.1	0.78	0.1	0.78
Iron	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND
Lead	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Manganese	0.0025	0.043	0.0025	0.0081	0.0025	0.0081	0.0025	ND	0.0025	0.065	0.0025	0.043	0.0025	ND	0.0025	0.057	0.0025	0.13
Mercury	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND
Nickel	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	0.0031	0.002	0.0048
Nitrogen/Nitrate	0.1	0.26	0.1	0.27	0.1	0.27	0.1	0.4	0.1	0.37	0.1	0.3	0.1	0.51	0.1	0.12	0.1	0.69
Nitrogen/Nitrate, Nit	0.1	0.26	0.1	0.27	0.1	0.27	0.1	0.4	0.1	0.37	0.1	0.3	0.1	0.51	0.1	0.12	0.1	0.69
Nitrogen/Nitrite	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND
Perchlorate	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND
Selenium	0.0025	0.0028	0.0025	ND	0.0025	ND	0.0025	0.0029	0.0025	ND	0.0025	ND	0.0025	0.0028	0.0025	ND	0.0025	ND
Silver	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Sulfate	25	110	25	110	25	110	25	110	25	94	20	82	20	100	20	160	20	270
Thallium	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND
Total Dissolved Solic	10	530	10	590	10	590	10	540	10	570	10	520	10	590	10	780	10	950
Vanadium	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND
Zinc	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND
Benzene	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
BETX	0.0025	ND	0.0025	ND	0.0025	0.00072	0.0025	ND	0.0025	ND	0.0025	0.0011	0.0025	ND	0.0025	ND	0.0025	ND
pH	NA	7.12	NA	6.97	NA	7.15	NA	7.46	NA	6.93	NA	7.5	NA	7.02	NA	7.12	NA	6.91
Temperature	NA	18.70	NA	14.16	NA	11.57	NA	15.40	NA	20.76	NA	16.65	NA	11.60	NA	12.40	NA	16.00
Conductivity	NA	0.07	NA	0.64	NA	0.57	NA	0.631	NA	0.698	NA	0.629	NA	0.944	NA	1.070	NA	0.146
Dissolved Oxygen	NA	0.51	NA	2.73	NA	2.16	NA	2.18	NA	3.26	NA	3.18	NA	0.45	NA	0.29	NA	0.34
ORP	NA	19.2	NA	-85.3	NA	-23.3	NA	-31.6	NA	-91.1	NA	-57.2	NA	88.5	NA	233.1	NA	34.3

Sample: MW-01	12/6/2019		2/19/2020		5/26/2020		8/5/2020		11/3/2020		2/23/2021		5/24/2021		8/23/2021		11/19/2021	
Parameter	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result
Antimony	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND
Arsenic	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND
Barium	0.0025	0.11	0.0025	0.093	0.0025	0.08	0.0025	0.097	0.0025	0.1	0.0025	0.095	0.0025	0.096	0.0025	0.1	0.0025	0.093
Beryllium	0.001	ND	0.001	ND ^	0.001	ND	0.001	ND	0.001	ND ^	0.001	ND ^	0.001	ND	0.001	ND	0.001	ND
Boron	0.05	2.5	0.05	2.7	0.05	2.1	0.25	2.7	0.5	2.9	0.25	2.4	0.5	2.2	0.5	2.5	0.25	2.1
Cadmium	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Chloride	2	25	2	21	2	35	2	16	2	23	2	25	2	18	2	18	2	28
Chromium	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND
Cobalt	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND
Copper	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	0.0022	0.002	ND
Cyanide	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND
Fluoride	0.1	0.78	0.1	0.73	0.1	0.71	0.1	0.73	0.1	0.7	0.1	0.58	0.1	0.61	0.1	0.59	0.1	0.55
Iron	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND
Lead	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Manganese	0.0025	0.11	0.0025	0.079	0.0025	0.067	0.0025	0.1	0.0025	0.058	0.0025	0.017	0.0025	0.037	0.0025	0.067	0.0025	0.022
Mercury	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND
Nickel	0.002	0.0045	0.002	0.0041	0.002	0.0041	0.002	0.0042	0.002	0.0041	0.002	0.0032	0.002	0.0042	0.002	0.0066	0.002	0.0036
Nitrogen/Nitrate	0.1	1.4	0.1	0.8	0.1	0.16	0.1	0.13	0.1	ND	0.1	0.22	0.1	0.4	0.1	0.13	0.1	0.4
Nitrogen/Nitrate, Nit	0.1	1.4	0.1	0.8	0.1	0.16	0.1	0.13	0.1	ND	0.1	0.22	0.1	0.4	0.1	0.13	0.1	0.4
Nitrogen/Nitrite	0.02	ND H3	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND
Perchlorate	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND
Selenium	0.0025	0.0027	0.0025	0.0061	0.0025	0.0025	0.0025	0.0026	0.0025	0.0068	0.0025	0.017	0.0025	0.013	0.0025	0.0076	0.0025	0.02
Silver	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND F1	0.0005	ND	0.0005	ND	0.0005	ND
Sulfate	20	340	20	ND	20	300	100	300	50	260	100	270	100	350	100	410	100	250
Thallium	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND
Total Dissolved Solic	10	1000	10	1000	10	910	30	950	30	2800	10	860 H	10	1100	10	1200	10	990
Vanadium	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND
Zinc	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND
Benzene	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
BETX	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND
pH	NA	6.93	NA	6.91	NA	6.88	NA	6.58	NA	6.60	NA	6.89	NA	6.86	NA	6.99	NA	6.62
Temperature	NA	14.90	NA	11.71	NA	13.30	NA	15.90	NA	16.70	NA	12.80	NA	13.90	NA	18.00	NA	16.40
Conductivity	NA	1.669	NA	1.007	NA	1.289	NA	1.414	NA	0.270	NA	1.492	NA	1.503	NA	3.985	NA	1.486
Dissolved Oxygen	NA	0.73	NA	2.79	NA	0.59	NA	NM	NA	0.31	NA	0.63	NA	0.18	NA	0.63	NA	0.54
ORP	NA	26.3	NA	145.0	NA	74.8	NA	83.4	NA	-23.5	NA	33.9	NA	174.0	NA	110.6	NA	119.6

Notes: Standards obtained from IAC, Title 35, Chapter I, Part 620, Subpart D, Section 620.410 - Groundwater Quality Standards for Class I: Potable Resource Groundwater.
All values are in mg/L (ppm) unless otherwise noted.

DL - Detection limit
NA - Not Applicable
ND - Not Detected

NM - Not Measured
NR - Not Required
NS - Not Sampled

Temperature	°C	degrees Celcius
Conductivity	ms/cm^{c}	millisiemens/centimeters
Dissolved Oxygen	mg/L	milligrams/liter
Oxygen Reduction Potential (ORP)	mV	millivolts

^ - Denotes instrument related QC exceeds the control limits
F1 - MS and/or MSD Recovery outside of limits
F2 - MS/MSD RPD exceeds control limits
H - Prepped/analyzed beyond the holding time

Sample: MW-02	Date	12/13/2010		3/28/2011		6/15/2011		9/15/2011		12/8/2011		3/16/2012		6/20/2012		9/24/2012		12/18/2012	
Parameter	Standards	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result
Antimony	0.006	0.0030	ND^	0.0030	ND	0.015	ND	0.0030	0.0073	0.0030	0.017	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND
Arsenic	0.010	0.0010	0.0052	0.0010	0.0032	0.0050	ND	0.0010	0.0080	0.0010	0.0058	0.0010	0.0048	0.0010	0.0044	0.0010	0.0071	0.0010	0.0046
Barium	2.0	0.0025	0.061	0.0025	0.068	0.013	0.068	0.0025	0.048	0.0025	0.048	0.0025	0.058	0.0025	0.062	0.0025	0.050	0.0025	0.051
Beryllium	0.004	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND
Boron	2.0	0.25	1.8	0.25	1.7	0.050	2.3	0.050	2.3	0.050	1.7	0.25	1.7	0.50	2.0	0.25	2.2	0.50	1.8
Cadmium	0.005	0.00050	ND	0.00050	ND	0.0025	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Chloride	200.0	10	110	10	250	10	180	10	110	10	120	10	140	10	150	10	110	10	130
Chromium	0.1	0.0050	ND	0.0050	ND	0.025	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND
Cobalt	1.0	0.0010	ND	0.0010	ND	0.0050	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND
Copper	0.65	0.0020	ND	0.0020	ND	0.010	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Cyanide	0.2	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND
Fluoride	4.0	0.10	0.62	0.10	0.50	0.10	0.42	0.10	0.59	0.10	0.59	0.10	0.46	0.10	0.55	0.10	0.71	0.10	0.60 ^
Iron	5.0	0.10	ND	0.10	ND	0.50	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND
Lead	0.0075	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Manganese	0.15	0.0025	0.032	0.0025	0.032	0.013	0.043	0.0025	0.036	0.0025	0.031	0.0025	0.031	0.0025	0.038	0.0025	0.029	0.0025	0.033
Mercury	0.002	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND
Nickel	0.1	0.0020	ND	0.0020	ND	0.010	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Nitrogen/Nitrate	10.0	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND
Nitrogen/Nitrate, Nit	NA	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND
Nitrogen/Nitrite	NA	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND
Perchlorate	0.0049	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.004	ND
Selenium	0.05	0.0025	ND	0.0025	ND	0.013	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND
Silver	0.05	0.00050	ND	0.00050	ND	0.0025	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Sulfate	400.0	100	430	100	280	50	400	50	330	50	220	50	330	100	340	50	280	50	250
Thallium	0.002	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Total Dissolved Solic	1,200	10	870	10	970	10	900	10	720	10	650	10	810	10	850	10	690	10	710
Vanadium	0.049	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.0050	ND
Zinc	5.0	0.020	ND	0.020	ND	0.10	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND
Benzene	0.005	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.0005	ND
BETX	11.705	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.0025	ND
pH	6.5 - 9.0	NA	8.62	NA	8.62	NA	8.00	NA	8.11	NA	7.80	NA	8.34	NA	8.23	NA	8.33	NA	8.40
Temperature	NA	NA	16.29	NA	13.56	NA	15.90	NA	18.05	NA	16.14	NA	14.74	NA	16.59	NA	19.10	NA	15.58
Conductivity	NA	NA	1.37	NA	1.64	NA	1.54	NA	0.96	NA	0.83	NA	0.95	NA	1.12	NA	0.91	NA	0.88
Dissolved Oxygen	NA	NA	NM	NA	0.19	NA	0.07	NA	0.06	NA	0.06	NA	0.02	NA	0.03	NA	0.14	NA	0.06
ORP	NA	NA	NM	NA	-154.9	NA	63	NA	-309	NA	-147	NA	-104	NA	-160	NA	-156	NA	-106

Sample: MW-02	3/5/2013		5/23/2013		8/14/2013		10/28/2013		2/20/2014		5/20/2014		8/13/2014		10/20/2014		2/4/2015	
Parameter	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result
Antimony	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND
Arsenic	0.0010	0.0037	0.0010	0.0051	0.0010	0.0059	0.0010	0.0091	0.0010	0.0071	0.0010	0.0053	0.0010	0.0096	0.0010	0.013	0.0010	0.0095
Barium	0.0025	0.057	0.0025	0.071	0.0025	0.075	0.0025	0.079	0.0025	0.080	0.0025	0.077	0.0025	0.089	0.0025	0.10	0.0025	0.092
Beryllium	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND^	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND
Boron	0.50	1.7	0.50	1.9	0.50	2.2	0.10	2.4	0.25	2.4	0.50	2.8	0.25	3.0	0.50	3.6	1.0	3.8
Cadmium	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Chloride	10	190	10	200	10	170	10	180	10	170	10	130	10	100	10	97	10	130
Chromium	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND
Cobalt	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND
Copper	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Cyanide	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND
Fluoride	0.10	0.48 ^	0.10	0.47	0.10	0.45	0.10	0.47	0.10	0.44	0.10	0.39	0.10	0.41	0.10	0.39	0.10	0.41
Iron	0.10	ND	0.10	ND	0.10	0.14	0.10	0.33	0.10	ND	0.10	ND	0.10	0.29	0.10	0.64	0.10	0.17
Lead	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Manganese	0.0025	0.029	0.0025	0.041	0.0025	0.041	0.0025	0.043	0.0025	0.044	0.0025	0.024	0.0025	0.074	0.0025	0.083	0.0025	0.064
Mercury	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND
Nickel	0.0020	ND	0.0020	ND	0.0020	0.0021	0.0020	0.0024	0.0020	0.0024	0.0020	0.0023	0.0020	0.0026	0.0020	0.0029	0.0020	0.0029
Nitrogen/Nitrate	0.10	0.11	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	0.16	0.10	ND	0.10	ND	0.10	ND
Nitrogen/Nitrate, Nit	0.10	0.11	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	0.16	0.10	ND	0.10	ND	0.10	ND
Nitrogen/Nitrite	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND
Perchlorate	0.004	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND
Selenium	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND
Silver	0.00050	ND	0.00050	ND	0.00050	ND ^	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Sulfate	50	260	50	250	100	300	100	280	100	210	100	300	100	340	100	510	100	400
Thallium	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Total Dissolved Solic	10	740	10	890	10	900	10	950	10	1000	10	1000	10	1100	10	1200	10	1200
Vanadium	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND
Zinc	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND
Benzene	0.0005	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.0005	ND	0.0005	ND
BETX	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	0.00083	0.0025	ND	0.0025	ND
pH	NA	7.79	NA	8.00	NA	7.93	NA	8.06	NA	8.97	NA	7.74	NA	7.59	NA	6.94	NA	8.14
Temperature	NA	12.00	NA	15.53	NA	16.36	NA	15.02	NA	11.56	NA	17.35	NA	18.69	NA	17.11	NA	14.26
Conductivity	NA	0.97	NA	1.06	NA	1.10	NA	1.06	NA	1.02	NA	1.31	NA	1.38	NA	1.63	NA	1.37
Dissolved Oxygen	NA	3.81	NA	0.52	NA	0.19	NA	0.54	NA	1.31	NA	0.72	NA	0.38	NA	0.31	NA	0.90
ORP	NA	189.8	NA	-117.5	NA	-160.5	NA	-172.5	NA	-161.4	NA	-28.3	NA	-107.9	NA	-135.2	NA	-126.8

Sample: MW-02	5/1/2015		7/28/2015		11/10/2015		2/17/2016		5/25/2016		8/11/2016		10/27/2016		2/2/2017		5/10/2017	
Parameter	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result
Antimony	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND ^	0.0030	ND
Arsenic	0.0010	0.0076	0.0010	0.013	0.0010	0.018	0.0010	0.0072	0.0010	0.0088	0.0010	0.018	0.0010	0.017	0.0020	0.0075	0.0010	0.0025
Barium	0.0025	0.096	0.0025	0.093	0.0025	0.098	0.0025	0.092	0.0025	0.088	0.0025	0.090	0.0025	0.093	0.0025	0.078	0.0025	0.075
Beryllium	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND^	0.0010	ND	0.0010	ND
Boron	0.25	3.8	0.50	4.0	0.50	4.4	0.050	4.3	0.050	3.9	0.25	4.1	0.50	4.9	0.50	4.3	0.50	3.6
Cadmium	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Chloride	10	110	10	90	10	110	10	80	2.0	64	2.0	72	2.0	71	2.0	56	2.0	44
Chromium	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND
Cobalt	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND
Copper	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Cyanide	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND
Fluoride	0.10	0.38	0.10	0.38	0.10	0.40	0.10	0.38	0.10	0.32	0.10	0.34	0.10	0.36	0.10	0.40	0.10	0.18
Iron	0.10	ND	0.10	0.58	0.10	0.78	0.10	ND	0.10	0.21	0.10	1.0	0.10	1.0	0.10	0.15	0.10	0.42
Lead	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	0.0012
Manganese	0.0025	0.055	0.0025	0.085	0.0025	0.068	0.0025	0.080	0.0025	0.061	0.0025	0.083 B	0.0025	0.092	0.0025	0.079	0.0025	0.21
Mercury	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND ^	0.00020	ND
Nickel	0.0020	0.0032	0.0020	0.0029	0.0020	0.0031	0.0020	0.0048	0.0020	0.0032	0.0020	0.0038	0.0020	0.0038	0.0020	0.0029	0.0020	0.0085
Nitrogen/Nitrate	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	0.13	0.10	ND	0.10	ND	0.10	ND	0.10	ND
Nitrogen/Nitrate, Nit	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	0.13	0.10	ND	0.10	ND	0.10	ND	0.10	ND
Nitrogen/Nitrite	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND
Perchlorate	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND
Selenium	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0050	ND	0.0025	ND
Silver	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Sulfate	100	460	100	610	100	600	200	710	250	650	250	510	250	670	100	590	250	470
Thallium	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Total Dissolved Solic	10	1200	10	1300	10	1000	10	1300	10	1300	10	1500	10	1500	10	1400	10	1300
Vanadium	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND
Zinc	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND ^	0.020	ND
Benzene	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	0.00057
BETX	0.0025	ND	0.0025	ND	0.0025	0.00072	0.0025	ND	0.0025	ND	0.0025	0.00055	0.0025	ND	0.0025	ND	0.0025	ND
pH	NA	8.00	NA	7.94	NA	8.06	NA	7.63	NA	7.50	NA	7.60	NA	7.86	NA	7.76	NA	8.26
Temperature	NA	18.64	NA	19.83	NA	15.84	NA	8.11	NA	18.77	NA	26.04	NA	14.23	NA	11.16	NA	14.08
Conductivity	NA	1.581	NA	1.718	NA	1.495	NA	1.05	NA	1.70	NA	1.97	NA	1.54	NA	1.42	NA	1.35
Dissolved Oxygen	NA	1.60	NA	0.75	NA	0.49	NA	1.68	NA	1.30	NA	2.33	NA	2.28	NA	0.84	NA	2.48
ORP	NA	-116.1	NA	-112.8	NA	-143.6	NA	-96.1	NA	-81.0	NA	-136.7	NA	-148.3	NA	-47.6	NA	-17.1

Sample: MW-02	9/8/2017		11/15/2017		2/28/2018		5/2/2018		7/24/2018		10/4/2018		2/19/2019		5/28/2019		8/21/2019	
Parameter	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result
Antimony	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND
Arsenic	0.001	0.016	0.001	0.012	0.001	0.012	0.001	0.0053	0.001	0.011	0.001	0.012	0.001	0.0078	0.001	0.0078	0.001	0.0094
Barium	0.0025	0.075	0.0025	0.076	0.0025	0.076	0.0025	0.074	0.0025	0.072	0.0025	0.073	0.0025	0.068	0.0025	0.058	0.0025	0.053
Beryllium	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND ^
Boron	0.5	5.0	1	5.1	1	5.1	0.5	5.1	0.5	4.9	1	5.4	1	4.1	1	3.8	1	5.7
Cadmium	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Chloride	2	64	2	57	2	57	2	57	2	43	2	62	2	39	2	22	2	27
Chromium	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND
Cobalt	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND
Copper	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND
Cyanide	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND
Fluoride	0.1	0.34	0.1	0.34	0.1	0.34	0.1	0.34	0.1	0.31	0.1	0.38	0.1	0.32	0.1	0.24	0.1	0.33
Iron	0.1	0.8	0.1	0.67	0.1	0.67	0.1	ND	0.1	0.64	0.1	0.83	0.1	0.17	0.1	ND	0.1	0.27
Lead	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Manganese	0.0025	0.071	0.0025	0.074	0.0025	0.074	0.0025	0.026	0.0025	0.066	0.0025	0.069	0.0025	0.055	0.0025	0.029	0.0025	0.04
Mercury	0.0002	0.00028	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND
Nickel	0.002	0.0028	0.002	0.0028	0.002	0.0028	0.002	0.0031	0.002	0.0028	0.002	0.0028	0.002	0.0026	0.002	ND	0.002	0.002
Nitrogen/Nitrate	0.1	ND	0.1	ND	0.1	ND	0.1	0.1	0.1	ND	0.1	ND	0.1	ND	0.1	0.17	0.1	ND
Nitrogen/Nitrate, Nit	0.1	ND	0.1	ND	0.1	ND	0.1	0.1	0.1	ND	0.1	ND	0.1	ND	0.1	0.17	0.1	ND
Nitrogen/Nitrite	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND
Perchlorate	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND
Selenium	0.0025	0.026	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	0.0029	0.0025	ND	0.0025	ND	0.0025	ND
Silver	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Sulfate	250	870	250	670	250	670	200	1100	100	650	100	640	100	580	100	460	100	440
Thallium	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND
Total Dissolved Solic	10	1400	10	1400	10	1400	10	1400	10	1400	10	1400	10	1300	10	1200	10	1000
Vanadium	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND
Zinc	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND
Benzene	0.0005	ND	0.0005	0.00063	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
BETX	0.0025	ND	0.0025	0.00513	0.0025	0.001	0.0025	ND	0.0025	ND	0.0025	0.0014	0.0025	ND	0.0025	ND	0.0025	ND
pH	NA	7.66	NA	7.48	NA	7.43	NA	7.82	NA	6.99	NA	7.93	NA	7.61	NA	7.66	NA	7.73
Temperature	NA	16.90	NA	13.59	NA	12.82	NA	18.11	NA	21.65	NA	17.93	NA	14.90	NA	14.10	NA	16.70
Conductivity	NA	1.55	NA	1.43	NA	1.29	NA	1.516	NA	1.554	NA	1.459	NA	1.785	NA	1.590	NA	0.175
Dissolved Oxygen	NA	0.28	NA	2.98	NA	0.98	NA	2.06	NA	1.95	NA	1.19	NA	0.07	NA	0.41	NA	0.24
ORP	NA	-144.0	NA	-119.8	NA	-87.5	NA	-62.3	NA	-105.7	NA	-107.4	NA	-110.5	NA	10.1	NA	-135.1

Sample: MW-02	12/6/2019		2/27/2020		5/22/2020		8/5/2020		11/3/2020		2/25/2021		5/24/2021		8/23/2021		11/19/2021	
Parameter	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result
Antimony	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND
Arsenic	0.001	0.012	0.001	0.0097	0.001	0.0073	0.001	0.01	0.001	0.0095	0.001	0.0082	0.001	0.0079	0.001	0.01	0.001	0.011
Barium	0.0025	0.073	0.0025	0.058	0.0025	0.058	0.0025	0.059	0.0025	0.056	0.0025	0.058	0.0025	0.059	0.0025	0.063	0.0025	0.062
Beryllium	0.001	ND	0.001	ND ^	0.001	ND	0.001	ND	0.001	ND^	0.001	ND ^	0.001	ND	0.001	ND	0.001	ND
Boron	1	5.4	1	4.4	1	4.4	0.5	5.4	1	5.1	1	5.4	1	5.2	1	4.9	1	5.7
Cadmium	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Chloride	2	62	2	25	2	16	2	17	2	21	2	27	2	24	2	25	2	27
Chromium	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND
Cobalt	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND
Copper	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND
Cyanide	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND
Fluoride	0.1	0.38	0.1	0.34	0.1	0.32	0.1	0.38	0.1	0.41	0.1	0.4	0.1	0.4	0.1	0.37	0.1	0.38
Iron	0.1	0.83	0.1	0.13	0.1	0.13	0.1	0.32	0.1	0.28	0.1	0.1	0.1	0.1	0.1	0.42	0.1	0.41
Lead	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Manganese	0.0025	0.069	0.0025	0.048	0.0025	0.038	0.0025	0.055	0.0025	0.044	0.0025	0.053	0.0025	0.029	0.0025	0.054	0.0025	0.053
Mercury	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND
Nickel	0.002	0.0028	0.002	0.0023	0.002	ND	0.002	ND	0.002	ND	0.002	0.0021	0.002	0.0023	0.002	0.0032	0.002	0.0024
Nitrogen/Nitrate	0.1	ND	0.1	ND	0.1	0.1	0.1	ND	0.1	ND	0.1	0.15	0.1	ND	0.02	ND	0.1	ND
Nitrogen/Nitrate, Nit	0.1	ND	0.1	ND	0.1	0.1	0.1	ND	0.1	ND	0.1	0.15	0.1	ND	0.1	ND	0.1	ND
Nitrogen/Nitrite	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.1	ND	0.02	ND
Perchlorate	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND
Selenium	0.0025	0.0029	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	0.0051	0.0025	0.0025	0.0025	ND	0.0025	0.0086	0.0025	0.008
Silver	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Sulfate	100	640	100	ND	100	450	100	450	50	440	100	520	130	550	100	540	100	510
Thallium	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND
Total Dissolved Solic	10	1400	10	1000	10	980	30	980	30	1000	10	1100	10	1100	10	1100	10	1100
Vanadium	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND
Zinc	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND
Benzene	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
BETX	0.0025	0.0014	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND
pH	NA	7.93	NA	7.57	NA	7.62	NA	7.32	NA	7.41	NA	7.88	NA	7.77	NA	8.02	NA	7.72
Temperature	NA	17.93	NA	13.65	NA	14.10	NA	16.00	NA	17.40	NA	13.90	NA	15.30	NA	17.90	NA	17.20
Conductivity	NA	1.459	NA	1.059	NA	1.570	NA	1.422	NA	1.500	NA	1.512	NA	1.495	NA	3.352	NA	1.607
Dissolved Oxygen	NA	1.19	NA	3.33	NA	0.82	NA	NM	NA	0.35	NA	0.13	NA	0.57	NA	0.28	NA	0.44
ORP	NA	-107.4	NA	-105.6	NA	-60.4	NA	-111.5	NA	-181.9	NA	-113.0	NA	140.2	NA	-204.2	NA	-172.9

Notes: Standards obtained from IAC, Title 35, Chapter I, Part 620, Subpart D, Section 620.410 - Groundwater Quality Standards for Class I: Potable Resource Groundwater.
All values are in mg/L (ppm) unless otherwise noted.

DL - Detection limit
NA - Not Applicable
ND - Not Detected

NM - Not Measured
NR - Not Required
NS - Not Sampled

Temperature	°C	degrees Celcius
Conductivity	ms/cm^{c}	millisiemens/centimeters
Dissolved Oxygen	mg/L	milligrams/liter
Oxygen Reduction Potential (ORP)	mV	millivolts

^ - Denotes instrument related QC exceeds the control limits
F1 - MS and/or MSD Recovery outside of limits
F2 - MS/MSD RPD exceeds control limits
H - Prepped/analyzed beyond the holding time

Sample: MW-03	Date	12/13/2010		3/28/2011		6/15/2011		9/15/2011		12/8/2011		3/16/2012		6/20/2012		9/24/2012		12/18/2012	
Parameter	Standards	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result
Antimony	0.006	0.0030	ND^	0.0030	ND	0.015	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND
Arsenic	0.010	0.0010	0.0020	0.0010	0.0024	0.0050	ND	0.0010	0.0025	0.0010	0.0018	0.0010	0.0017	0.0010	0.0020	0.0010	0.0026	0.0010	0.0019
Barium	2.0	0.0025	0.084	0.0025	0.086	0.013	0.071	0.0025	0.079	0.0025	0.083	0.0025	0.075	0.0025	0.12	0.0025	0.085	0.0025	0.079
Beryllium	0.004	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND
Boron	2.0	0.25	2.7	0.25	2.4	0.050	2.6	0.050	3.3	0.050	2.8	0.25	2.7	0.50	3.1	0.25	3.9	0.50	3.4
Cadmium	0.005	0.00050	ND	0.00050	ND	0.0025	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Chloride	200.0	2.0	54	10	250	10	100	10	130	10	100	10	95	10	88	10	96	10	100
Chromium	0.1	0.0050	ND	0.0050	ND	0.025	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND
Cobalt	1.0	0.0010	ND	0.0010	0.0022	0.0050	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND
Copper	0.65	0.0020	ND	0.0020	ND	0.010	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Cyanide	0.2	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND
Fluoride	4.0	0.10	0.50	0.10	0.37	0.10	0.36	0.10	0.45	0.10	0.39	0.10	0.38	0.10	0.36	0.10	0.45	0.10	0.44 ^
Iron	5.0	0.10	0.37	0.10	0.57	0.50	ND	0.10	0.26	0.10	0.19	0.10	0.20	0.10	0.34	0.10	0.21	0.10	0.20
Lead	0.0075	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Manganese	0.15	0.0025	0.34	0.0025	0.31	0.013	0.34	0.0025	0.26	0.0025	0.29	0.0025	0.27	0.0025	0.37	0.0025	0.24	0.0025	0.25
Mercury	0.002	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND
Nickel	0.1	0.0020	0.0054	0.0020	0.0037	0.010	ND	0.0020	0.0061	0.0020	0.0053	0.0020	0.0052	0.0020	0.0051	0.0020	0.0069	0.0020	0.0079
Nitrogen/Nitrate	10.0	0.10	ND	0.10	ND	0.10	0.81	0.10	ND	0.10	0.54	0.10	ND	0.10	0.18	0.10	ND	0.10	ND
Nitrogen/Nitrate, Nit	NA	0.10	ND	0.10	ND	0.10	0.81	0.10	ND	0.10	0.54	0.10	ND	0.10	0.18	0.10	ND^	0.10	ND
Nitrogen/Nitrite	NA	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND
Perchlorate	0.0049	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.004	ND
Selenium	0.05	0.0025	ND	0.0025	ND	0.013	ND	0.0025	0.0033	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	0.0040	0.0025	ND
Silver	0.05	0.00050	ND	0.00050	ND	0.0025	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Sulfate	400.0	100	330	50	270	50	240	100	250	100	280	100	320	100	500	100	440	100	480
Thallium	0.002	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Total Dissolved Solic	1,200	10	940	10	1000	10	990	10	1000	10	930	10	1000	10	1400	10	1100	10	1100
Vanadium	0.049	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.0050	ND
Zinc	5.0	0.020	ND	0.020	ND	0.10	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND
Benzene	0.005	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.0005	ND
BETX	11.705	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.0025	ND
pH	6.5 - 9.0	NA	7.21	NA	7.72	NA	7.01	NA	7.18	NA	6.55	NA	7.24	NA	6.79	NA	7.12	NA	7.21
Temperature	NA	NA	12.84	NA	9.89	NA	14.19	NA	15.69	NA	13.57	NA	11.65	NA	15.47	NA	17.33	NA	13.40
Conductivity	NA	NA	1.52	NA	1.69	NA	1.46	NA	1.24	NA	1.14	NA	1.06	NA	1.48	NA	1.38	NA	1.25
Dissolved Oxygen	NA	NA	NM	NA	0.18	NA	3.15	NA	0.02	NA	0.06	NA	0.02	NA	0.03	NA	0.02	NA	0.15
ORP	NA	NA	NM	NA	-157.3	NA	115.5	NA	-285	NA	-113	NA	-31	NA	-50	NA	-34	NA	-57

Sample: MW-03	3/5/2013		5/22/2013		8/14/2013		10/28/2013		2/13/2014		5/21/2014		8/12/2014		10/20/2014		2/4/2015	
Parameter	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result
Antimony	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND
Arsenic	0.0010	0.0017	0.0010	0.0019	0.0010	0.0023	0.0010	0.0018	0.0010	ND	0.0010	ND	0.0010	0.0021	0.0010	ND	0.0010	ND
Barium	0.0025	0.085	0.0025	0.095	0.0025	0.083	0.0025	0.083	0.0025	0.095	0.0025	0.071	0.0025	0.064	0.0025	0.077	0.0025	0.094
Beryllium	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND^	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND
Boron	0.50	3.2	0.50	3.7	0.50	3.6	0.10	3.5	0.50	3.2	0.50	3.3	0.25	3.5	0.50	3.6	1.0	2.9
Cadmium	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Chloride	10	87	10	110	10	100	10	110	2.0	69	2.0	62	10	91	2.0	57	2.0	43
Chromium	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND
Cobalt	0.0010	ND	0.0010	0.0011	0.0010	0.0014	0.0010	0.0016	0.0010	ND	0.0010	ND	0.0010	0.0011	0.0010	ND	0.0010	ND
Copper	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Cyanide	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND
Fluoride	0.10	0.38 ^	0.10	0.41	0.10	0.42	0.10	0.49	0.10	0.41	0.10	0.43	0.10	0.56	0.10	0.51	0.10	0.38
Iron	0.10	0.20	0.10	0.21	0.10	0.26	0.10	ND	0.10	ND	0.10	ND	0.10	0.13	0.10	ND	0.10	0.18
Lead	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Manganese	0.0025	0.29	0.0025	0.22	0.0025	0.19	0.0025	0.16	0.0025	0.45	0.0025	0.25	0.0025	0.16	0.0025	0.29	0.0025	0.47
Mercury	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND
Nickel	0.0020	0.0061	0.0020	0.0088	0.0020	0.010	0.0020	0.011	0.0020	0.0058	0.0020	0.0061	0.0020	0.010	0.0020	0.0073	0.0020	0.0055
Nitrogen/Nitrate	0.10	0.21	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND
Nitrogen/Nitrate, Nit	0.10	0.21	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND
Nitrogen/Nitrite	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND
Perchlorate	0.004	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND
Selenium	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	0.0049	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	0.0025
Silver	0.00050	ND	0.00050	ND	0.00050	ND ^	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Sulfate	100	390	100	610	100	530	100	540	100	560	100	560	100	570	100	570	100	320
Thallium	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Total Dissolved Solic	10	1100	10	1200	10	1200	10	1100	10	1200	10	1200	10	1100	10	1100	10	1100
Vanadium	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND
Zinc	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND
Benzene	0.0005	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
BETX	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND
pH	NA	7.88	NA	7.21	NA	7.20	NA	7.24	NA	7.03	NA	7.21	NA	7.39	NA	6.06	NA	7.11
Temperature	NA	9.50	NA	16.15	NA	16.84	NA	14.53	NA	9.92	NA	15.74	NA	16.79	NA	14.39	NA	10.34
Conductivity	NA	1.18	NA	1.39	NA	1.37	NA	1.22	NA	1.03	NA	1.43	NA	1.40	NA	1.48	NA	1.11
Dissolved Oxygen	NA	3.93	NA	0.58	NA	0.43	NA	0.51	NA	0.81	NA	0.73	NA	1.45	NA	0.43	NA	1.81
ORP	NA	60.1	NA	-65.3	NA	-66.4	NA	-138.6	NA	434.5	NA	18.4	NA	-90.3	NA	47.7	NA	7.2

Sample: MW-03	5/1/2015		7/28/2015		11/10/2015		2/17/2016		5/25/2016		8/11/2016		10/27/2016		2/1/2017		5/11/2017	
Parameter	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result
Antimony	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND ^	0.0030	ND
Arsenic	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	0.0011	0.0010	ND	0.0010	ND	0.0010	ND	0.0020	ND	0.0010	0.0070
Barium	0.0025	0.093	0.0025	0.081	0.0025	0.11	0.0025	0.079	0.0025	0.088	0.0025	0.11	0.0025	0.11	0.0025	0.083	0.0025	0.067
Beryllium	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND^	0.0010	ND	0.0010	ND
Boron	0.25	2.9	0.50	4.1	0.50	3.0	0.050	3.0	0.050	2.9	0.25	3.1	0.50	3.3 F1	0.25	3.0	0.50	4.1
Cadmium	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Chloride	2.0	33	2.0	59	10	33	2.0	28	2.0	27	2.0	27	2.0	22	2.0	20	2.0	43
Chromium	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND
Cobalt	0.0010	ND	0.0010	0.0013	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	0.0011	0.0010	ND	0.0010	ND	0.0010	ND
Copper	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Cyanide	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND
Fluoride	0.10	0.38	0.10	0.44	0.10	0.39	0.10	0.41	0.10	0.41	0.10	0.36	0.10	0.38	0.10	0.34	0.10	0.27
Iron	0.10	0.12	0.10	0.13	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND
Lead	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Manganese	0.0025	0.43	0.0025	0.28	0.0025	0.42	0.0025	0.33	0.0025	0.35	0.0025	0.41 B	0.0025	0.49	0.0025	0.33	0.0025	0.033
Mercury	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND ^	0.00020	ND
Nickel	0.0020	0.0047	0.0020	0.0086	0.0020	0.0049	0.0020	0.0073	0.0020	0.0061	0.0020	0.0073	0.0020	0.0064	0.0020	0.0068	0.0020	0.0021
Nitrogen/Nitrate	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	0.30	0.10	ND	0.10	0.82	0.10	0.20
Nitrogen/Nitrate, Nit	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	0.30	0.10	ND	0.10	0.82	0.10	0.20
Nitrogen/Nitrite	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND
Perchlorate	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND
Selenium	0.0025	ND	0.0025	ND	0.0025	0.0043	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND F1	0.0050	ND	0.0025	ND
Silver	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Sulfate	100	250	100	520	50	280	100	400	100	370	100	230	50	240	100	310	100	510
Thallium	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Total Dissolved Solic	10	990	10	1100	10	950	10	980	10	960	10	930	10	910	10	940	10	1100
Vanadium	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND
Zinc	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND ^	0.020	ND
Benzene	0.00050	ND	0.00050	ND	0.0005	ND	0.0005	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
BETX	0.0025	ND	0.0025	ND	0.0025	0.0014	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND
pH	NA	7.07	NA	7.63	NA	6.81	NA	7.10	NA	7.02	NA	6.90	NA	6.97	NA	7.18	NA	8.12
Temperature	NA	11.15	NA	18.62	NA	13.54	NA	9.00	NA	20.09	NA	20.43	NA	13.88	NA	7.94	NA	12.14
Conductivity	NA	1.139	NA	1.472	NA	1.155	NA	0.84	NA	1.26	NA	1.26	NA	1.05	NA	0.97	NA	1.07
Dissolved Oxygen	NA	2.99	NA	1.13	NA	1.08	NA	1.27	NA	2.02	NA	1.32	NA	2.10	NA	2.23	NA	2.05
ORP	NA	-18.3	NA	-124.6	NA	-6.0	NA	44.1	NA	-74.2	NA	-95.1	NA	-82.0	NA	-70.7	NA	-60.1

Sample: MW-03	9/8/2017		11/16/2017		2/28/2018		5/2/2018		7/24/2018		10/4/2018		2/20/2019		5/29/2019		8/21/2019	
Parameter	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result
Antimony	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND
Arsenic	0.001	0.0014	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND
Barium	0.0025	0.11	0.0025	0.11	0.0025	0.11	0.0025	0.09	0.0025	0.096	0.0025	0.11	0.0025	0.086	0.0025	0.086	0.0025	0.086
Beryllium	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND ^
Boron	0.25	1.3	0.5	2.8	0.5	2.8	0.05	2.3	0.5	3.3	0.5	2.5	0.5	2.4	0.5	2.9	0.5	2.9
Cadmium	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Chloride	10	98	2	16	2	16	2	16	2	20	2	22	2	35	2	19	2	41
Chromium	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND
Cobalt	0.001	ND	0.001	0.0011	0.001	0.0011	0.001	ND	0.001	0.0011	0.001	ND	0.001	ND	0.001	ND	0.001	0.0014
Copper	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND
Cyanide	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND
Fluoride	0.1	0.39	0.1	0.39	0.1	0.39	0.1	0.39	0.1	0.36	0.1	0.38	0.1	0.36	0.1	0.29	0.1	0.38
Iron	0.1	0.12	0.1	ND	0.1	ND	0.1	ND	0.1	0.12	0.1	0.16	0.1	ND	0.1	ND	0.1	0.14
Lead	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Manganese	0.0025	0.49	0.0025	0.46	0.0025	0.46	0.0025	0.35	0.0025	0.35	0.0025	0.54	0.0025	0.31	0.0025	0.26	0.0025	0.35
Mercury	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND
Nickel	0.002	0.0062	0.002	0.0054	0.002	0.0054	0.002	0.0052	0.002	0.0065	0.002	0.0043	0.002	0.0059	0.002	0.0058	0.002	0.0078
Nitrogen/Nitrate	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	0.26	0.1	0.58	0.1	ND
Nitrogen/Nitrate, Nit	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	0.26	0.1	0.58	0.1	ND
Nitrogen/Nitrite	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND
Perchlorate	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND
Selenium	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND
Silver	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Sulfate	50	190	50	210	50	210	100	270	100	280	50	120	50	300	50	290	50	360
Thallium	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND
Total Dissolved Solic	10	940	10	930	10	930	10	880	10	940	10	820	10	880	10	970	10	960
Vanadium	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND
Zinc	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND
Benzene	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
BETX	0.0025	ND	0.0025	0.00071	0.0025	0.0013	0.0025	ND	0.0025	ND	0.0025	0.0011	0.0025	ND	0.0025	ND	0.0025	ND
pH	NA	6.82	NA	6.63	NA	7.10	NA	7.29	NA	6.60	NA	7.09	NA	6.86	NA	7.15	NA	7.15
Temperature	NA	15.80	NA	11.45	NA	11.87	NA	16.66	NA	20.11	NA	15.47	NA	11.00	NA	12.00	NA	15.20
Conductivity	NA	1.07	NA	0.93	NA	0.903	NA	0.099	NA	1.072	NA	0.962	NA	1.380	NA	1.330	NA	0.218
Dissolved Oxygen	NA	0.18	NA	2.69	NA	3.13	NA	1.60	NA	3.95	NA	2.22	NA	0.12	NA	0.20	NA	0.31
ORP	NA	-2.9	NA	-41.2	NA	-44.2	NA	-21.0	NA	-66.1	NA	-56.6	NA	109.6	NA	-2.1	NA	-23.6

Sample: MW-03	12/6/2019		2/27/2020		5/26/2020		8/7/2020		11/4/2020		3/1/2021		5/24/2021		8/24/2021		11/19/2021	
Parameter	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result
Antimony	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND
Arsenic	0.001	ND	0.001	ND	0.001	ND	0.001	0.0017	0.001	ND	0.001	ND	0.001	ND	0.001	0.0013	0.001	ND
Barium	0.0025	0.089	0.0025	0.088	0.0025	0.07	0.0025	0.077	0.0025	0.088	0.0025	0.097	0.0025	0.11	0.0025	0.089	0.0025	0.12
Beryllium	0.001	ND	0.001	ND ^	0.001	ND	0.001	ND	0.001	ND ^	0.001	ND	0.001	ND	0.001	ND	0.001	ND
Boron	0.5	3.2	0.5	2.6	0.5	3.1	0.5	4.2	1	3.2	0.5	3.6	0.5	3.0	0.5	3.5	0.5	3.7
Cadmium	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Chloride	2	12	2	14	2	17	2	21	2	40	2	17	2	19	2	30	2	27
Chromium	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND
Cobalt	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND
Copper	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND
Cyanide	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.005	0.0067	0.005	ND	0.005	ND	0.005	ND
Fluoride	0.1	0.49	0.1	0.4	0.1	0.32	0.1	0.38	0.1	0.45	0.1	0.3	0.1	0.32	0.1	0.32	0.1	0.32
Iron	0.1	ND	0.1	ND	0.1	0.11	0.1	0.18	0.1	0.13	0.1	ND	0.1	ND	0.1	0.15	0.1	ND
Lead	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Manganese	0.0025	0.24	0.0025	0.27	0.0025	0.2	0.0025	0.21	0.0025	0.27	0.0025	0.27	0.0025	0.35	0.0025	0.25	0.0025	0.42
Mercury	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND
Nickel	0.002	0.0047	0.002	0.0047	0.002	0.0052	0.002	0.0062	0.002	0.009	0.002	0.0056	0.002	0.0051	0.002	0.0084	0.002	0.0067
Nitrogen/Nitrate	0.1	ND	0.1	ND	0.1	0.21	0.1	ND	0.1	ND	0.1	ND	0.1	0.32	0.1	ND	0.1	0.25
Nitrogen/Nitrate, Nit	0.1	ND	0.1	ND	0.1	0.21	0.1	ND	0.1	ND	0.1	ND	0.1	0.32	0.1	ND	0.1	0.25
Nitrogen/Nitrite	0.02	ND H3	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND ^1+	0.02	ND
Perchlorate	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND
Selenium	0.0025	ND ^	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	0.0056	0.0025	ND	0.0025	0.01
Silver	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Sulfate	50	260	50	ND	50	310	100	360	50	330	100	340	130	270	100	290	50	340
Thallium	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND
Total Dissolved Solic	10	710	10	770	10	700	30	870	60	940	10	1000	10	870	10	720	10	1000
Vanadium	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND
Zinc	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND
Benzene	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
BETX	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND
pH	NA	7.05	NA	6.83	NA	7.15	NA	6.78	NA	7.14	NA	7.19	NA	6.91	NA	7.28	NA	6.67
Temperature	NA	13.40	NA	10.12	NA	12.00	NA	14.80	NA	15.00	NA	10.60	NA	12.50	NA	16.00	NA	14.60
Conductivity	NA	1.226	NA	0.743	NA	1.235	NA	1.341	NA	1.330	NA	1.425	NA	1.249	NA	1.568	NA	1.533
Dissolved Oxygen	NA	0.81	NA	3.01	NA	0.59	NA	NM	NA	0.25	NA	-0.01	NA	0.10	NA	0.98	NA	0.53
ORP	NA	-29.8	NA	-80.1	NA	-36.8	NA	-58.4	NA	-75.9	NA	-69.3	NA	138.6	NA	-189.8	NA	22.2

Notes: Standards obtained from IAC, Title 35, Chapter I, Part 620, Subpart D, Section 620.410 - Groundwater Quality Standards for Class I: Potable Resource Groundwater.
All values are in mg/L (ppm) unless otherwise noted.

DL - Detection limit
NA - Not Applicable
ND - Not Detected

NM - Not Measured
NR - Not Required
NS - Not Sampled

Temperature	°C	degrees Celcius
Conductivity	ms/cm^{c}	millisiemens/centimeters
Dissolved Oxygen	mg/L	milligrams/liter
Oxygen Reduction Potential (ORP)	mV	millivolts

^ - Denotes instrument related QC exceeds the control limits
F1 - MS and/or MSD Recovery outside of limits
F2 - MS/MSD RPD exceeds control limits
H - Prepped/analyzed beyond the holding time

Attachment 9-3. Table. CCA Groundwater Analytical Results - Midwest Generation LLC, Will County Station, Romeoville, IL

Sample: MW-04	Date	12/13/2010		3/28/2011		6/15/2011		9/15/2011		12/8/2011		3/16/2012		6/20/2012		9/24/2012		12/18/2012		3/5/2013		5/22/2013	
Parameter	Standards	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result
Antimony	0.006	0.0030	ND^	0.0030	ND	0.015	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND
Arsenic	0.010	0.0010	0.0027	0.0010	0.0016	0.0050	ND	0.0010	0.0041	0.0010	0.0016	0.0010	0.0015	0.0010	0.0028	0.0010	0.0044	0.0020	0.0033	0.0010	0.0010	0.0010	0.0013
Barium	2.0	0.0025	0.068	0.0025	0.062	0.013	0.050	0.0025	0.050	0.0025	0.043	0.0025	0.036	0.0025	0.041	0.0025	0.041	0.0050	0.037	0.0025	0.033	0.0025	0.034
Beryllium	0.004	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0020	ND	0.0010	ND	0.0010	ND
Boron	2.0	0.25	3.7	0.25	3.3	0.050	3.6	0.050	4.3	0.050	3.0	0.25	4.0	0.50	5.3	0.25	6.2	0.10	5.2	0.50	4.5	0.50	3.8
Cadmium	0.005	0.00050	ND	0.00050	ND	0.0025	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.0010	ND	0.00050	ND	0.00050	ND
Chloride	200.0	10	120	10	190	10	120	10	170	10	150	10	150	10	140	10	170	10	170	10	150	10	110
Chromium	0.1	0.0050	ND	0.0050	ND	0.025	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.010	ND	0.0050	ND	0.0050	ND
Cobalt	1.0	0.0010	0.0011	0.0010	ND	0.0050	ND	0.0010	0.0012	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0020	ND	0.0010	ND	0.0010	ND
Copper	0.65	0.0020	ND	0.0020	ND	0.010	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0040	ND	0.0020	ND	0.0020	0.0023
Cyanide	0.2	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND
Fluoride	4.0	0.10	0.52	0.10	0.49	0.10	0.48	0.10	0.53	0.10	0.55	0.10	0.50	0.10	0.62	0.10	0.68	0.10	0.63 ^	0.10	0.56 ^	0.10	0.60
Iron	5.0	0.10	0.83	0.10	0.78	0.50	0.70	0.10	1.2	0.10	0.64	0.10	0.53	0.10	0.95	0.10	0.83	0.20	1.2	0.10	0.20	0.10	ND
Lead	0.0075	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.0010	ND	0.00050	ND	0.00050	ND
Manganese	0.15	0.0025	0.52	0.0025	0.58	0.013	0.70	0.0025	1.0	0.0025	0.62	0.0025	0.60	0.0025	0.70	0.0025	0.99	0.0050	0.62	0.0025	0.47	0.0025	0.44
Mercury	0.002	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND
Nickel	0.1	0.0020	0.0048	0.0020	0.0041	0.010	ND	0.0020	0.0051	0.0020	0.0047	0.0020	0.0048	0.0020	0.0047	0.0020	0.0046	0.0040	0.0050	0.0020	0.0047	0.0020	0.0044
Nitrogen/Nitrate	10.0	0.10	ND	0.10	ND	0.10	0.19	0.10	ND	0.10	0.37	0.10	0.45	0.10	ND	0.10	ND	0.10	ND	0.10	0.69	0.10	0.42
Nitrogen/Nitrate, Nit	NA	0.10	ND	0.10	ND	0.10	0.19	0.10	ND	0.10	0.37	0.10	0.45	0.10	ND	0.10	ND^	0.10	ND	0.10	0.69	0.10	0.42
Nitrogen/Nitrite	NA	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND
Perchlorate	0.0049	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.02	ND	0.004	ND	0.0040	ND
Selenium	0.05	0.0025	ND	0.0025	0.0033	0.013	ND	0.0025	ND	0.0025	0.0086	0.0025	0.0067	0.0025	ND	0.0025	0.0026	0.0050	ND	0.0025	0.015	0.0025	0.0087
Silver	0.05	0.00050	ND	0.00050	ND	0.0025	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.0010	ND	0.00050	ND	0.00050	ND
Sulfate	400.0	250	1500	500	1500	250	1600	1000	4800	500	1600	500	2000	500	2800	500	3200	500	2200	500	2000	500	1500
Thallium	0.002	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Total Dissolved Soli	1,200	10	2500	10	2600	10	2800	25	6000	13	3100	13	3700	25	4300	17	4400	17	4000	17	3600	13	2900
Vanadium	0.049	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.01	ND	0.0050	ND	0.0050	ND
Zinc	5.0	0.020	ND	0.020	ND	0.10	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.040	ND	0.020	ND	0.020	ND
Benzene	0.005	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.0005	ND	0.0005	ND	0.00050	ND
BETX	11.705	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.0025	ND	0.0025	ND	0.0025	ND
pH	6.5 - 9.0	NA	7.37	NA	7.66	NA	7.23	NA	7.21	NA	6.58	NA	7.27	NA	7.10	NA	7.29	NA	7.34	NA	6.61	NA	7.07
Temperature	NA	NA	14.22	NA	10.18	NA	13.86	NA	16.26	NA	13.65	NA	11.77	NA	16.18	NA	17.98	NA	14.14	NA	9.60	NA	13.54
Conductivity	NA	NA	3.51	NA	3.39	NA	3.51	NA	5.26	NA	2.99	NA	3.22	NA	4.11	NA	4.73	NA	3.85	NA	3.28	NA	2.44
Dissolved Oxygen	NA	NA	NM	NA	0.73	NA	2.72	NA	0.03	NA	0.11	NA	0.16	NA	0.03	NA	0.03	NA	0.06	NA	1.88	NA	1.07
ORP	NA	NA	NM	NA	-235.2	NA	44.8	NA	-269	NA	-104	NA	-41	NA	-76	NA	-66	NA	-79	NA	87.2	NA	-3.9

Sample: MW-04	Date	8/14/2013		10/28/2013		2/13/2014		5/21/2014		8/13/2014		10/20/2014		2/4/2015		5/1/2015		7/28/2015		11/11/2015		2/17/2016		5/25/2016	
Parameter	Standards	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result
Antimony	0.006	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND
Arsenic	0.010	0.0010	0.0032	0.0010	0.0054	0.0010	0.0010	0.0010	ND	0.0010	0.0010	0.0010	0.0011	0.0010	0.0013	0.0010	ND	0.0010	ND	0.0010	0.0019	0.0010	0.0013	0.0010	ND
Barium	2.0	0.0025	0.033	0.0025	0.037	0.0025	0.034	0.0025	0.030	0.0025	0.034	0.0025	0.037	0.0025	0.031	0.0025	0.031	0.0025	0.038	0.0025	0.039	0.0025	0.038	0.0025	0.034
Beryllium	0.004	0.0010	ND	0.0010	ND	0.0010	ND^	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND
Boron	2.0	0.50	5.1	0.10	5.6	0.50	4.6	0.50	4.2	0.25	4.8	0.50	4.5	1.0	3.9	0.25	4.0	0.50	5.4	0.50	5.0	0.050	4.9	0.050	4.3
Cadmium	0.005	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Chloride	200.0	10	120	10	89	10	110	10	85	2.0	67	10	82	10	120	10	110	10	97	2.0	46	10	84	2.0	73
Chromium	0.1	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND
Cobalt	1.0	0.0010	ND	0.0010	0.0014	0.0010	0.0012	0.0010	ND	0.0010	0.0013	0.0010	0.0011	0.0010	ND	0.0010	ND	0.0010	0.0011	0.0010	0.0013	0.0010	0.0012	0.0010	ND
Copper	0.65	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Cyanide	0.2	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND
Fluoride	4.0	0.10	0.66	0.10	0.47	0.10	0.43	0.10	0.43	0.10	0.47	0.10	0.54	0.10	0.52	0.10	0.47	0.10	0.56	0.10	0.43	0.10	0.52	0.10	0.50
Iron	5.0	0.10	0.66	0.10	0.92	0.10	0.64	0.10	ND	0.10	0.26	0.10	0.27	0.10	0.28	0.10	ND	0.10	0.16	0.10	0.51	0.10	0.11	0.10	0.12
Lead	0.0075	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Manganese	0.15	0.0025	0.58	0.0025	0.65	0.0025	0.72	0.0025	0.49	0.0025	0.88	0.0025	0.64	0.0025	0.52	0.0025	0.45	0.0025	0.77	0.0025	0.62	0.0025	0.70	0.0025	0.45
Mercury	0.002	0.00020	ND	0.00020	ND	0.00020	0.00066	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND
Nickel	0.1	0.0020	0.0043	0.0020	0.0055	0.0020	0.0053	0.0020	0.0045	0.0020	0.0058	0.0020	0.0065	0.0020	0.0043	0.0020	0.0057	0.0020	0.0053	0.0020	0.0070	0.0020	0.0079	0.0020	0.0047
Nitrogen/Nitrate	10.0	0.10	ND	0.10	ND	0.10	ND	0.10	0.39	0.10	ND	0.10	0.15	0.10	0.17	0.10	0.53	0.10	0.11	0.10	ND	0.10	0.34	0.10	0.25
Nitrogen/Nitrate, Nit	NA	0.10	ND	0.10	ND	0.10	ND	0.10	0.39	0.10	ND	0.10	0.15	0.10	0.17	0.10	0.53	0.10	0.11	0.10	ND	0.10	0.34	0.10	0.25
Nitrogen/Nitrite	NA	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND
Perchlorate	0.0049	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND
Selenium	0.05	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	0.0090	0.0025	0.0055	0.0025	0.010	0.0025	0.0087	0.0025	0.020	0.0025	0.0046	0.0025	0.0081	0.0025	0.0077	0.0025	0.012
Silver	0.05	0.00050	ND ^	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Sulfate	400.0	500	2200	250	1300	250	1400	250	1100	250	1200	250	1600	250	1100	250	860	500	1600	250	870	500	1800	500	1300
Thallium	0.002	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Total Dissolved Soli	1,200	25	3500	13	2400	13	2800	10	2500	10	2200	10	2600	10	2600	10	2300	17	3200	10	1900	13	3200	13	2700
Vanadium	0.049	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND
Zinc	5.0	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND
Benzene	0.005	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.0005	ND	0.0005	ND	0.00050	ND
BETX	11.705	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND
pH	6.5 - 9.0	NA	7.15	NA	6.74	NA	7.03	NA	6.96	NA	6.75	NA	5.87	NA	7.13	NA	7.15	NA	7.29	NA	6.65	NA	7.05	NA	6.85
Temperature	NA	NA	17.54	NA	16.62	NA	10.22	NA	19.98	NA	18.18	NA	16.64	NA	8.13	NA	13.74	NA	20.17	NA	16.27	NA	10.03	NA	18.45
Conductivity	NA	NA	3.58	NA	2.84	NA	1.42	NA	3.06	NA	2.41	NA	3.07	NA	2.21	NA	2.364	NA	3.852	NA	2.183	NA	2.46	NA	3.10
Dissolved Oxygen	NA	NA	0.34	NA	0.36	NA	0.81	NA	1.66	NA	0.43	NA	0.44	NA	2.01	NA	1.83	NA	0.90	NA	1.12	NA	0.95	NA	1.81
ORP	NA	NA	-38.2	NA	-127.7	NA	-1.6	NA	-0.8	NA	3.6	NA	3.1	NA	16.7	NA	9.3	NA	-73.4	NA	-33.0	NA	-18.7	NA	-10.3

Sample: MW-04	Date	8/11/2016		10/27/2016		2/1/2017		5/11/2017		9/8/2017		11/16/2017		2/28/2018		5/2/2018		7/24/2018		10/3/2018		2/20/2019	
Parameter	Standards	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result
Antimony	0.006	0.0030	ND	0.0030	ND	0.0030	ND ^	0.0030	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND
Arsenic	0.010	0.0010	ND	0.0010	ND	0.0020	ND	0.0010	ND	0.001	0.0012	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND
Barium	2.0	0.0025	0.038	0.0025	0.044	0.0025	0.035	0.0025	0.043	0.0025	0.036	0.0025	0.039	0.0025	0.039	0.0025	0.034	0.0025	0.043	0.0025	0.042	0.0025	0.052
Beryllium	0.004	0.0010	ND	0.0010	ND^	0.0010	ND	0.0010	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND
Boron	2.0	0.25	4.8	0.50	6.1	0.50	5.0	0.50	5.0	0.5	5.4	1	5.5	1	5.5	0.05	4.0	0.5	6.0	0.5	4.4	0.5	3.4
Cadmium	0.005	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Chloride	200.0	2.0	54	2.0	72	2.0	57	2.0	46	2	31	2	37	2	37	2	33	2	32	2	28	2	70
Chromium	0.1	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND
Cobalt	1.0	0.0010	ND	0.0010	0.0011	0.0010	0.0010	0.0010	0.0014	0.001	ND	0.001	0.0012	0.001	0.0012	0.001	ND	0.001	0.0013	0.001	0.0011	0.001	0.0012
Copper	0.65	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND
Cyanide	0.2	0.010	ND	0.010	0.035	0.010	ND	0.010	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND
Fluoride	4.0	0.10	0.46	0.10	0.50	0.10	0.43	0.10	0.33	0.1	0.46	0.1	0.48	0.1	0.48	0.1	0.45	0.1	0.46	0.1	0.42	0.1	0.38
Iron	5.0	0.10	0.28	0.10	0.16	0.10	0.11	0.10	0.28	0.1	0.21	0.1	0.17	0.1	0.17	0.1	ND	0.1	0.4	0.1	0.35	0.1	0.19
Lead	0.0075	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Manganese	0.15	0.0025	0.57 B	0.0025	0.64	0.0025	0.57	0.0025	0.70	0.0025	0.54	0.0025	0.51	0.0025	0.51	0.0025	0.38	0.0025	0.62	0.0025	0.55	0.0025	0.59
Mercury	0.002	0.00020	0.00025	0.00020	ND	0.00020	ND ^	0.00020	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND
Nickel	0.1	0.0020	0.0057	0.0020	0.0058	0.0020	0.0046	0.0020	0.0047	0.002	0.0039	0.002	0.005	0.002	0.005	0.002	0.0035	0.002	0.0043	0.002	0.0041	0.002	0.0045
Nitrogen/Nitrate	10.0	0.10	ND	0.10	ND	0.10	0.86	0.10	ND	0.1	ND	0.1	0.19	0.1	0.19	0.1	0.42	0.1	ND	0.1	ND	0.1	0.93
Nitrogen/Nitrate, Nit	NA	0.10	ND	0.10	ND	0.10	0.86	0.10	ND	0.1	ND	0.1	0.19	0.1	0.19	0.1	0.42	0.1	ND	0.1	ND	0.1	0.93
Nitrogen/Nitrite	NA	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND
Perchlorate	0.0049	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND
Selenium	0.05	0.0025	0.0042	0.0025	ND	0.0050	0.011	0.0025	0.0026	0.0025	ND	0.0025	0.0056	0.0025	0.0056	0.0025	0.0071	0.0025	ND	0.0025	ND	0.0025	0.014
Silver	0.05	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.0005	ND	0.0005	ND ^	0.0005	ND ^	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Sulfate	400.0	250	880	500	1400	500	1200	500	1300	250	830	250	1100	250	1100	250	1100	250	1300	250	410	250	920
Thallium	0.002	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND
Total Dissolved Soli	1,200	10	2200	10	2800	10	2700	10	2800	10	2000	10	2200	10	2200	10	2200	10	2600	10	1600	10	2100
Vanadium	0.049	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND
Zinc	5.0	0.020	ND	0.020	ND	0.020	ND ^	0.020	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND
Benzene	0.005	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
BETX	11.705	0.0025	0.00050	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	0.00099	0.0025	ND	0.0025	ND	0.0025	0.0015	0.0025	ND
pH	6.5 - 9.0	NA	6.78	NA	7.01	NA	6.87	NA	7.67	NA	6.86	NA	6.63	NA	6.81	NA	7.25	NA	6.43	NA	6.96	NA	6.68
Temperature	NA	NA	21.76	NA	14.80	NA	8.85	NA	12.24	NA	17.50	NA	13.78	NA	11.33	NA	16.13	NA	18.56	NA	21.53	NA	10.70
Conductivity	NA	NA	2.74	NA	2.67	NA	2.29	NA	2.45	NA	2.00	NA	2.03	NA	1.607	NA	2.111	NA	2.389	NA	1.921	NA	2.653
Dissolved Oxygen	NA	NA	1.68	NA	3.02	NA	2.13	NA	3.44	NA	0.39	NA	1.54	NA	2.35	NA	1.08	NA	2.79	NA	1.79	NA	0.03
ORP	NA	NA	-116.2	NA	-6.4	NA	-27.0	NA	-7.8	NA	1.5	NA	-79.4	NA	-16.8	NA	-35.3	NA	-68.7	NA	-4.4	NA	60.2

Sample: MW-04	Date	5/29/2019		8/21/2019		12/5/2019		2/27/2020		5/26/2020		8/7/2020		11/4/2020		2/22/2021		5/24/2021		8/24/2021		11/19/2021	
Parameter	Standards	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result
Antimony	0.006	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND
Arsenic	0.010	0.001	ND	0.001	0.0014	0.001	0.0013	0.001	0.0012	0.001	ND	0.001	0.0022	0.001	0.0017	0.001	0.0011	0.001	ND	0.001	0.002	0.001	0.0049
Barium	2.0	0.0025	0.045	0.0025	0.054	0.0025	0.047	0.0025	0.039	0.0025	0.04	0.0025	0.041	0.0025	0.037	0.0025	0.04	0.0025	0.044	0.0025	0.046	0.0025	0.045
Beryllium	0.004	0.001	ND	0.001	ND ^	0.001	ND	0.001	ND ^	0.001	ND	0.001	ND	0.001	ND ^	0.001	ND ^	0.001	ND	0.001	ND	0.001	ND
Boron	2.0	0.5	3.3	0.5	5.9	0.5	6.4	0.5	4.5	0.5	5.8	1	6.8	1	5.5	1	5.3	1	5.1	1	5.9	1	6.0
Cadmium	0.005	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Chloride	200.0	2	37	2	28	2	22	2	18	2	15	2	15	2	20	2	16	2	24	2	21	2	23
Chromium	0.1	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND
Cobalt	1.0	0.001	ND	0.001	0.0015	0.001	ND	0.001	ND	0.001	0.0011	0.001	ND	0.001	0.0012	0.001	0.0018	0.001	0.0017	0.001	0.0018	0.001	0.0022
Copper	0.65	0.002	ND	0.002	ND	0.002	0.0025	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND
Cyanide	0.2	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND
Fluoride	4.0	0.1	0.39	0.1	0.44	0.1	0.51	0.1	0.41	0.1	0.43	0.1	0.47	0.1	0.44	0.1	0.37	0.1	0.37	0.1	0.38	0.1	0.36
Iron	5.0	0.1	0.24	0.1	0.91	0.1	0.31	0.1	0.26	0.1	0.52	0.1	0.85	0.1	0.72	0.1	0.43	0.1	0.58	0.1	0.89	0.1	1.6
Lead	0.0075	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Manganese	0.15	0.0025	0.55	0.0025	0.69	0.0025	0.5	0.0025	0.48	0.0025	0.52	0.0025	0.52	0.0025	0.56	0.0025	0.76	0.0025	0.74	0.0025	0.75	0.0025	0.9
Mercury	0.002	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND
Nickel	0.1	0.002	0.004	0.002	0.0063	0.002	0.0041	0.002	0.0031	0.002	0.0038	0.002	0.0034	0.002	0.0057	0.002	0.0054	0.002	0.0065	0.002	0.011	0.002	0.01
Nitrogen/Nitrate	10.0	0.1	ND	0.1	ND	0.1	0.52	0.1	0.32	0.1	ND	0.1	ND	0.1	ND	0.1	0.35	0.1	ND	0.1	ND	0.1	ND
Nitrogen/Nitrate, Nit	NA	0.1	ND ^	0.1	ND	0.1	0.52	0.1	0.32	0.1	ND	0.1	ND	0.1	ND	0.1	0.35	0.1	ND	0.1	ND	0.1	ND
Nitrogen/Nitrite	NA	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND
Perchlorate	0.0049	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND
Selenium	0.05	0.0025	0.0094	0.0025	ND	0.0025	0.009	0.0025	0.0066	0.0025	ND	0.0025	ND	0.0025	0.0089	0.0025	0.013	0.0025	ND	0.0025	ND	0.0025	0.004
Silver	0.05	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Sulfate	400.0	250	650	250	1100	250	1200	250	1100	250	1100	250	970	100	630	100	860	130	990	150	1100	250	850
Thallium	0.002	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND
Total Dissolved Soli	1,200	10	2000	10	2200	10	2400	10	2200	10	2200	150	1900	150	1800	10	1900 H	10	2000	10	2100	10	1900
Vanadium	0.049	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND
Zinc	5.0	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND
Benzene	0.005	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
BETX	11.705	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND
pH	6.5 - 9.0	NA	6.91	NA	7.04	NA	6.86	NA	6.56	NA	6.84	NA	6.86	NA	6.69	NA	6.84	NA	6.9	NA	7.09	NA	6.69
Temperature	NA	NA	11.70	NA	15.00	NA	13.80	NA	10.01	NA	11.70	NA	15.10	NA	16.00	NA	11.20	NA	14.30	NA	17.21	NA	15.60
Conductivity	NA	NA	2.260	NA	0.224	NA	3.025	NA	1.628	NA	2.851	NA	2.365	NA	2.000	NA	2.299	NA	2.400	NA	2.791	NA	2.407
Dissolved Oxygen	NA	NA	0.29	NA	0.37	NA	0.68	NA	2.79	NA	0.66	NA	NM	NA	0.19	NA	6.03	NA	1.28	NA	0.23	NA	3.16
ORP	NA	NA	7.7	NA	-46.3	NA	15.0	NA	-74.9	NA	-14.8	NA	-58.6	NA	-71.0	NA	-12.0	NA	133.8	NA	-106.1	NA	-55.2

Notes: Standards obtained from IAC, Title 35, Chapter I, Part 620, Subpart D, Section 620.410 - Groundwater Quality Standards for Class I: Potable Resource Groundwater.
All values are in mg/L (ppm) unless otherwise noted.

DL - Detection limit
NA - Not Applicable
ND - Not Detected

NM - Not Measured
NR - Not Required
NS - Not Sampled

Temperature °C degrees Celcius
Conductivity ms/cm^c millisiemens/centimeters
Dissolved Oxygen mg/L milligrams/liter
Oxygen Reduction Potential (ORP) mV millivolts

^ - Denotes instrument related QC exceeds the control limits
F1 - MS and/or MSD Recovery outside of limits
F2 - MS/MSD RPD exceeds control limits
H - Prepped/analyzed beyond the holding time

Sample: MW-05	Date	12/13/2010		3/28/2011		6/15/2011		9/15/2011		12/8/2011		3/16/2012		6/20/2012		9/24/2012		12/18/2012		3/5/2013		6/5/2013	
Parameter	Standards	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result
Antimony	0.006	0.0030	ND^	0.0030	ND	0.015	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND
Arsenic	0.010	0.0010	0.0066	0.0010	0.0048	0.0050	ND	0.0010	0.0025	0.0010	0.0065	0.0010	0.0065	0.0010	0.0073	0.0010	0.0023	0.0010	0.0058	0.0010	0.0069	0.0010	0.0020
Barium	2.0	0.0025	0.051	0.0025	0.060	0.013	0.067	0.0025	0.070	0.0025	0.061	0.0025	0.053	0.0025	0.040	0.0025	0.073	0.0025	0.045	0.0025	0.050	0.0025	0.11
Beryllium	0.004	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND
Boron	2.0	0.25	2.6	0.25	2.7	0.050	3.2	0.050	4.0	0.050	3.2	0.25	2.9	0.50	2.3	0.25	3.8	0.50	2.5	0.50	2.6	0.50	3.6
Cadmium	0.005	0.00050	ND	0.00050	ND	0.0025	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Chloride	200.0	10	110	10	150	10	140	10	150	10	130	10	170	10	150	10	160	10	150	10	140	10	110
Chromium	0.1	0.0050	ND	0.0050	ND	0.025	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND
Cobalt	1.0	0.0010	ND	0.0010	ND	0.0050	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND
Copper	0.65	0.0020	ND	0.0020	ND	0.010	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Cyanide	0.2	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND
Fluoride	4.0	0.10	0.41	0.10	0.40	0.10	0.46	0.10	0.49	0.10	0.38	0.10	0.42	0.10	0.59	0.10	0.44	0.10	0.47 ^	0.10	0.42 ^	0.10	0.30
Iron	5.0	0.10	ND	0.10	ND	0.50	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND
Lead	0.0075	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Manganese	0.15	0.0025	0.0079	0.0025	0.0067	0.013	0.055	0.0025	0.13	0.0025	0.038	0.0025	0.032	0.0025	0.014	0.0025	0.073	0.0025	0.023	0.0025	0.036	0.0025	0.15
Mercury	0.002	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND
Nickel	0.1	0.0020	ND	0.0020	ND	0.010	ND	0.0020	0.0021	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	0.0025	0.0020	0.0020	0.0020	0.0022	0.0020	0.0025
Nitrogen/Nitrate	10.0	0.10	0.27	0.10	1.6	0.10	1.1	0.10	0.11	0.10	1.0	0.10	0.11	0.10	0.24	0.10	0.11	0.10	ND	0.10	0.56	0.10	0.69
Nitrogen/Nitrate, Nit	NA	0.10	0.27	0.10	1.9	0.10	0.97	0.10	0.11	0.10	1.2	0.10	0.25	0.10	0.27	0.10	0.11	0.10	1.2	0.10	1.3	0.10	0.75
Nitrogen/Nitrite	NA	0.020	ND	0.10	0.31	0.020	0.13	0.020	ND	0.020	0.17	0.020	0.14	0.020	0.031	0.020	ND	0.20	1.2	0.10	0.74	0.020	0.059
Perchlorate	0.0049	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.004	ND	0.004	ND	0.0040	ND
Selenium	0.05	0.0025	0.017	0.0025	0.014	0.013	0.016	0.0025	0.0080	0.0025	0.010	0.0025	0.0059	0.0025	ND	0.0025	0.017	0.0025	0.0079	0.0025	0.010	0.0025	0.026
Silver	0.05	0.00050	ND	0.00050	ND	0.0025	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Sulfate	400.0	100	580	100	570	100	540	130	690	100	500	100	370	100	410	100	540	100	280	100	320	250	650
Thallium	0.002	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Total Dissolved Soli	1,200	10	1000	10	1300	10	1400	10	1500	10	1000	10	1000	10	750	10	1100	10	820	10	940	10	1600
Vanadium	0.049	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.0050	0.034	0.0050	0.025	0.0050	0.010
Zinc	5.0	0.020	ND	0.020	ND	0.10	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND
Benzene	0.005	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.0005	ND	0.0005	ND	0.00050	ND
BETX	11.705	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.0025	ND	0.0025	ND	0.0025	ND
pH	6.5 - 9.0	NA	9.58	NA	9.51	NA	7.44	NA	7.38	NA	8.20	NA	9.30	NA	9.41	NA	7.54	NA	9.37	NA	7.43	NA	7.00
Temperature	NA	NA	12.79	NA	7.95	NA	14.62	NA	17.22	NA	13.19	NA	10.98	NA	16.59	NA	19.67	NA	13.41	NA	8.10	NA	14.77
Conductivity	NA	NA	1.66	NA	1.93	NA	1.97	NA	1.78	NA	1.10	NA	1.02	NA	1.01	NA	1.44	NA	1.05	NA	1.02	NA	1.66
Dissolved Oxygen	NA	NA	NM	NA	3.81	NA	3.22	NA	0.51	NA	0.39	NA	0.21	NA	0.22	NA	0.66	NA	0.19	NA	4.84	NA	0.56
ORP	NA	NA	NM	NA	-156.4	NA	173.2	NA	-196	NA	-46	NA	47	NA	-1	NA	66	NA	8	NA	205.5	NA	-11.3

Sample: MW-05	Date	8/14/2013		10/28/2013		2/13/2014		5/21/2014		8/12/2014		10/20/2014		2/3/2015		5/1/2015		7/28/2015		11/11/2015		2/18/2016		5/26/2016	
Parameter	Standards	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result
Antimony	0.006	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND
Arsenic	0.010	0.0010	0.0025	0.0010	0.0021	0.0010	0.0017	0.0010	0.0015	0.0010	0.0031	0.0010	0.0014	0.0010	0.0028	0.0010	0.0019	0.0010	0.0011	0.0010	0.0014	0.0010	0.0015	0.0010	0.0024
Barium	2.0	0.0025	0.042	0.0025	0.078	0.0025	0.056	0.0025	0.075	0.0025	0.066	0.0025	0.061	0.0025	0.048	0.0025	0.072	0.0025	0.063	0.0025	0.078	0.0025	0.054	0.0025	0.059
Beryllium	0.004	0.0010	ND	0.0010	ND	0.0010	ND^	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND
Boron	2.0	0.50	3.5	0.10	4.1	0.50	2.7	0.50	2.9	0.25	2.7	0.50	4.7	1.0	2.4	0.25	3.7	0.50	5.3	0.50	5.9	0.050	4.1	0.050	3.7
Cadmium	0.005	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Chloride	200.0	10	120	10	130	10	130	10	160	10	170	10	81	10	200	10	180	10	100	10	110	10	120	10	96
Chromium	0.1	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND
Cobalt	1.0	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND
Copper	0.65	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Cyanide	0.2	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND
Fluoride	4.0	0.10	0.50	0.10	0.36	0.10	0.43	0.10	0.28	0.10	0.52	0.10	0.35	0.10	0.50	0.10	0.31	0.10	0.38	0.10	0.31	0.10	0.31	0.10	0.32
Iron	5.0	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND
Lead	0.0075	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Manganese	0.15	0.0025	0.060	0.0025	0.11	0.0025	0.053	0.0025	0.11	0.0025	0.062	0.0025	0.20	0.0025	0.046	0.0025	0.092	0.0025	0.13	0.0025	0.17	0.0025	0.11	0.0025	0.075
Mercury	0.002	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND
Nickel	0.1	0.0020	0.0039	0.0020	0.0028	0.0020	0.0024	0.0020	0.0020	0.0020	0.0031	0.0020	0.0049	0.0020	ND	0.0020	0.0023	0.0020	0.0034	0.0020	0.0026	0.0020	0.0053	0.0020	0.0030
Nitrogen/Nitrate	10.0	0.10	ND	0.10	0.27	0.10	0.24	0.10	0.72	0.10	ND	0.10	0.12	0.10	1.3	0.10	1.1	0.10	0.48	0.10	ND	0.10	0.61	0.10	0.51
Nitrogen/Nitrate, Nit	NA	0.10	ND	0.10	0.59	0.10	0.80	0.10	0.97	0.10	ND	0.10	0.12	0.10	1.6	0.10	1.2	0.10	0.48	0.10	ND	0.10	0.65	0.10	0.66
Nitrogen/Nitrite	NA	0.020	ND	0.10	0.32	0.10	0.56	0.040	0.25	0.020	0.098	0.020	ND	0.040	0.34	0.020	0.099	0.020	ND	0.020	ND	0.020	0.040	0.020	0.15
Perchlorate	0.0049	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND
Selenium	0.05	0.0025	ND	0.0025	0.17	0.0025	0.024	0.0025	0.013	0.0025	0.0051	0.0025	0.010	0.0025	0.0058	0.0025	0.020	0.0025	0.021	0.0025	0.035	0.0025	0.017	0.0025	0.027
Silver	0.05	0.00050	ND ^	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Sulfate	400.0	100	500	130	560	100	690	250	1700	250	610	250	840	100	430	100	480	250	770	250	780	250	730	250	600
Thallium	0.002	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Total Dissolved Soli	1,200	10	1100	10	1300	10	1400	10	1600	10	1400	10	2100	10	1100	10	1600	10	2000	10	1900	10	1700	10	1500
Vanadium	0.049	0.0050	0.0054	0.0050	0.013	0.0050	0.012	0.0050	0.018	0.0050	0.013	0.0050	0.010	0.0050	0.019	0.0050	0.012	0.0050	0.011	0.0050	0.016	0.0050	0.010	0.0050	0.013
Zinc	5.0	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND
Benzene	0.005	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.0005	ND	0.0005	ND	0.00050	ND
BETX	11.705	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	0.0015	0.0025	ND	0.0025	0.00068
pH	6.5 - 9.0	NA	7.88	NA	6.75	NA	8.45	NA	7.07	NA	7.36	NA	6.87	NA	9.70	NA	7.29	NA	7.13	NA	7.24	NA	6.99	NA	6.73
Temperature	NA	NA	16.72	NA	17.04	NA	9.59	NA	16.68	NA	16.80	NA	18.46	NA	8.29	NA	12.11	NA	20.61	NA	15.77	NA	8.54	NA	15.42
Conductivity	NA	NA	1.28	NA	1.55	NA	0.81	NA	1.92	NA	1.60	NA	2.59	NA	1.13	NA	1.691	NA	2.467	NA	2.016	NA	1.17	NA	1.69
Dissolved Oxygen	NA	NA	0.15	NA	0.92	NA	0.78	NA	0.46	NA	0.35	NA	0.81	NA	2.40	NA	1.53	NA	1.41	NA	1.17	NA	1.42	NA	2.12
ORP	NA	NA	20.8	NA	-73.8	NA	89.4	NA	87.6	NA	-24.6	NA	58.1	NA	-53.5	NA	31.4	NA	-50.4	NA	46.1	NA	21.7	NA	91.9

Sample: MW-05	Date	8/10/2016		10/26/2016		2/1/2017		5/11/2017		9/8/2017		11/16/2017		2/28/2018		5/2/2018		7/25/2018		10/3/2018		2/20/2019	
Parameter	Standards	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result
Antimony	0.006	0.0030	ND	0.0030	ND	0.0030	ND ^	0.0030	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND
Arsenic	0.010	0.0010	0.0050	0.0010	0.0060	0.0020	ND	0.0010	0.0035	0.001	0.0035	0.001	0.0051	0.001	0.0018	0.001	ND	0.001	0.0056	0.001	0.0024	0.001	0.0031
Barium	2.0	0.0025	0.071	0.0025	0.033	0.0025	0.050	0.0025	0.039	0.0025	0.039	0.0025	0.049	0.0025	0.065	0.0025	0.054	0.0025	0.03	0.0025	0.049	0.0025	0.029
Beryllium	0.004	0.0010	ND	0.0010	ND^	0.0010	ND	0.0010	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND
Boron	2.0	0.25	4.1	0.50	3.9	0.50	4.2	0.50	3.5	0.5	3.5	0.5	4.3	1	4.8	0.05	3.4	0.5	4.2	1	5.2	1	3.6
Cadmium	0.005	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Chloride	200.0	10	110	10	120	2.0	54	10	86	10	86	10	82	2	47	2	33	2	70	2	61	2	78
Chromium	0.1	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND
Cobalt	1.0	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND
Copper	0.65	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND
Cyanide	0.2	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND
Fluoride	4.0	0.10	0.46	0.10	0.72	0.10	0.36	0.10	0.40	0.1	0.4	0.1	0.57	0.1	0.45	0.1	0.38	0.1	0.69	0.1	0.57	0.1	0.59
Iron	5.0	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND
Lead	0.0075	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Manganese	0.15	0.0025	0.14 B	0.0025	0.019	0.0025	0.072	0.0025	0.052	0.0025	0.052	0.0025	0.039	0.0025	0.096	0.0025	0.071	0.0025	0.023	0.0025	0.083	0.0025	0.04
Mercury	0.002	0.00020	ND	0.00020	ND	0.00020	ND ^	0.00020	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND
Nickel	0.1	0.0020	0.0030	0.0020	0.0021	0.0020	0.0030	0.0020	ND	0.002	ND	0.002	0.002	0.002	0.0034	0.002	0.0028	0.002	0.0022	0.002	0.0023	0.002	ND
Nitrogen/Nitrate	10.0	0.10	ND	0.10	ND	0.10	0.75	0.10	ND	0.1	ND	0.1	ND	0.1	0.13	0.1	0.41	0.1	ND	0.1	ND	0.1	ND
Nitrogen/Nitrate, Nit	NA	0.10	0.13	0.10	ND	0.10	0.75	0.10	ND	0.1	ND	0.1	ND	0.1	0.13	0.1	0.41	0.1	ND	0.1	ND	0.1	ND
Nitrogen/Nitrite	NA	0.020	0.048	0.020	ND	0.020	ND	0.020	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	0.038
Perchlorate	0.0049	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND
Selenium	0.05	0.0025	0.012	0.0025	ND	0.0050	0.027	0.0025	0.0034	0.0025	0.0034	0.0025	0.0054	0.0025	0.014	0.0025	0.025	0.0025	ND	0.0025	ND	0.0025	ND
Silver	0.05	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.0005	ND	0.0005	ND	0.0005	ND ^	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Sulfate	400.0	130	530	100	360	100	500	100	470	100	470	100	470	100	640	100	580	100	460	100	420	100	420
Thallium	0.002	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND
Total Dissolved Soli	1,200	10	1200	10	820	10	1600	10	1000	10	1000	10	1000	10	1500	10	1400	10	960	10	1000	10	890
Vanadium	0.049	0.0050	0.022	0.0050	0.030	0.0050	0.0083	0.0050	0.0099	0.005	0.0099	0.005	0.011	0.005	0.011	0.005	0.0065	0.005	ND	0.005	ND	0.005	0.0066
Zinc	5.0	0.020	ND	0.020	ND	0.020	ND ^	0.020	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND
Benzene	0.005	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
BETX	11.705	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	0.0016	0.0025	ND	0.0025	ND	0.0025	0.0012	0.0025	ND
pH	6.5 - 9.0	NA	8.62	NA	9.08	NA	6.81	NA	7.86	NA	7.86	NA	9.4	NA	6.7	NA	7.23	NA	7.33	NA	7.07	NA	9.04
Temperature	NA	NA	24.37	NA	13.90	NA	9.44	NA	13.04	NA	13.04	NA	17.40	NA	11.71	NA	17.08	NA	19.00	NA	18.05	NA	10.40
Conductivity	NA	NA	1.57	NA	1.09	NA	1.44	NA	1.24	NA	1.24	NA	1.12	NA	1.35	NA	1.371	NA	1.070	NA	1.380	NA	1.301
Dissolved Oxygen	NA	NA	0.85	NA	2.24	NA	2.90	NA	1.62	NA	1.62	NA	1.19	NA	2.53	NA	2.66	NA	2.19	NA	3.00	NA	0.10
ORP	NA	NA	-207.6	NA	-76.7	NA	-10.3	NA	-34.8	NA	-34.8	NA	6.6	NA	-32.4	NA	-13.7	NA	-89.1	NA	100.6	NA	59.3

Sample: MW-05	Date	5/29/2019		8/21/2019		12/6/2019		2/27/2020		5/22/2020		8/6/2020		11/4/2020		2/23/2021		5/24/2021		8/24/2021		11/23/2021	
Parameter	Standards	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result
Antimony	0.006	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND
Arsenic	0.010	0.001	0.0034	0.001	0.0047	0.001	0.0027	0.001	0.002	0.001	0.0025	0.001	0.006	0.001	0.0016	0.001	ND	0.001	ND	0.001	0.0042	0.001	0.0024
Barium	2.0	0.0025	0.028	0.0025	0.036	0.0025	0.078	0.0025	0.049	0.0025	0.029	0.0025	0.025	0.0025	0.077	0.0025	0.038	0.0025	0.049	0.0025	0.028	0.0025	0.067
Beryllium	0.004	0.001	ND	0.001	ND ^	0.001	ND	0.001	ND ^	0.001	ND	0.001	ND	0.001	ND ^	0.001	ND ^	0.001	ND	0.001	ND	0.001	ND
Boron	2.0	1	3.5	1	4.2	1	4.8	1	3.3	1	4.1	0.5	5.1	1	5.1	1	5.6	1	4.9	1	4.6	1	5.4
Cadmium	0.005	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Chloride	200.0	2	76	2	48	2	31	2	29	2	72	2	49	2	32	2	10	2	29	10	87	2	22
Chromium	0.1	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND
Cobalt	1.0	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND
Copper	0.65	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND
Cyanide	0.2	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND *+
Fluoride	4.0	0.1	0.64	0.1	0.78	0.1	0.43	0.1	0.48	0.1	0.56	0.1	0.77	0.1	0.34	0.1	0.56	0.1	0.52	0.1	0.72	0.1	0.41
Iron	5.0	0.1	ND	0.1	ND	0.1	0.17	0.1	0.17	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	0.35
Lead	0.0075	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Manganese	0.15	0.0025	0.027	0.0025	0.046	0.0025	0.15	0.0025	0.12	0.0025	0.035	0.0025	0.014	0.0025	0.21	0.0025	0.044	0.0025	0.043	0.0025	0.048	0.0025	0.18
Mercury	0.002	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND
Nickel	0.1	0.002	0.002	0.002	0.0024	0.002	0.0023	0.002	0.0022	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	0.0025	0.002	0.0023
Nitrogen/Nitrate	10.0	0.1	ND	0.1	ND	0.1	ND	0.1	0.25	0.1	0.43	0.1	ND	0.1	0.15	0.1	0.15	0.1	0.39	0.1	ND	0.1	ND
Nitrogen/Nitrate, Nit	NA	0.1	ND ^	0.1	ND	0.1	ND	0.1	0.25	0.1	0.43	0.1	ND	0.1	0.15	0.1	0.15	0.1	0.39	0.1	ND	0.1	ND
Nitrogen/Nitrite	NA	0.02	0.021	0.02	ND	0.02	ND H3	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND ^1+	0.02	ND
Perchlorate	0.0049	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND
Selenium	0.05	0.0025	0.0026	0.0025	0.0025	0.0025	0.011	0.0025	0.018 F1	0.0025	0.0029	0.0025	ND	0.0025	0.083	0.0025	0.037	0.0025	0.048	0.0025	0.0062	0.0025	0.0082
Silver	0.05	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Sulfate	400.0	100	390	100	450	100	470	100	ND	100	410	100	420	50	410	100	380	150	440	50	400	100	380
Thallium	0.002	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND
Total Dissolved Soli	1,200	10	1000	10	950	10	1200	10	1100	10	850	30	750	60	1200	10	830 H	10	1000	10	750	10	1000
Vanadium	0.049	0.005	0.015	0.005	0.0073	0.005	ND	0.005	0.0057	0.005	0.015	0.005	0.014	0.005	0.013	0.005	ND	0.005	ND	0.005	ND	0.005	0.0055
Zinc	5.0	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND
Benzene	0.005	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
BETX	11.705	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND
pH	6.5 - 9.0	NA	8.45	NA	8.64	NA	6.95	NA	6.75	NA	7.39	NA	9.02	NA	7.06	NA	7.29	NA	7.07	NA	9.42	NA	6.8
Temperature	NA	NA	11.80	NA	16.20	NA	13.50	NA	9.76	NA	11.40	NA	15.40	NA	16.30	NA	10.70	NA	12.70	NA	16.93	NA	15.50
Conductivity	NA	NA	1.360	NA	0.193	NA	1.814	NA	1.097	NA	1.593	NA	1.123	NA	1.480	NA	1.269	NA	1.488	NA	1.781	NA	1.456
Dissolved Oxygen	NA	NA	0.22	NA	0.43	NA	0.72	NA	3.98	NA	0.80	NA	NM	NA	0.46	NA	2.97	NA	1.87	NA	0.18	NA	0.70
ORP	NA	NA	-9.7	NA	-78.8	NA	-2.6	NA	-66.0	NA	-11.1	NA	-55.6	NA	-42.1	NA	-11.0	NA	156.3	NA	-234.1	NA	163.1

Notes: Standards obtained from IAC, Title 35, Chapter I, Part 620, Subpart D, Section 620.410 - Groundwater Quality Standards for Class I: Potable Resource Groundwater.
All values are in mg/L (ppm) unless otherwise noted.

DL - Detection limit
NA - Not Applicable
ND - Not Detected

NM - Not Measured
NR - Not Required
NS - Not Sampled

Temperature °C degrees Celcius
Conductivity ms/cm^c millisiemens/centimeters
Dissolved Oxygen mg/L milligrams/liter
Oxygen Reduction Potential (ORP) mV millivolts

^ - Denotes instrument related QC exceeds the control limits
F1 - MS and/or MSD Recovery outside of limits
F2 - MS/MSD RPD exceeds control limits
H - Prepped/analyzed beyond the holding time

Sample: MW-06	Date	12/13/2010		3/28/2011		6/15/2011		9/15/2011		12/8/2011		3/16/2012		6/20/2012		9/24/2012		12/18/2012		3/5/2013		5/22/2013	
Parameter	Standards	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result
Antimony	0.006	0.0030	ND^	0.0030	ND	0.015	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND
Arsenic	0.010	0.0010	0.0018	0.0010	0.0018	0.0050	ND	0.0010	0.0031	0.0010	0.0022	0.0010	0.0022	0.0010	0.0021	0.0010	0.0026	0.0010	0.0020	0.0010	0.0019	0.0010	0.0014
Barium	2.0	0.0025	0.050	0.0025	0.040	0.013	0.045	0.0025	0.041	0.0025	0.053	0.0025	0.044	0.0025	0.046	0.0025	0.054	0.0025	0.051	0.0025	0.044	0.0025	0.057
Beryllium	0.004	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND
Boron	2.0	0.25	2.7	0.25	2.5	0.050	2.4	0.050	3.0	0.050	2.5	0.25	2.5	0.50	2.9	0.25	3.0	0.50	3.0	0.50	2.7	0.50	2.8
Cadmium	0.005	0.00050	ND	0.00050	ND	0.0025	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Chloride	200.0	10	120	10	210	10	150	10	120	10	120	10	110	10	92	10	110	10	110	10	130	10	110
Chromium	0.1	0.0050	ND	0.0050	ND	0.025	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND
Cobalt	1.0	0.0010	ND	0.0010	ND	0.0050	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND
Copper	0.65	0.0020	ND	0.0020	ND	0.010	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Cyanide	0.2	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND
Fluoride	4.0	0.10	0.85	0.10	0.88	0.10	0.79	0.10	0.97	0.10	0.77	0.10	0.68	0.10	0.81	0.10	ND	0.10	0.71 ^	0.10	0.71 ^	0.10	0.65
Iron	5.0	0.10	ND	0.10	ND	0.50	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND
Lead	0.0075	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Manganese	0.15	0.0025	0.073	0.0025	0.051	0.013	0.047	0.0025	0.024	0.0025	0.038	0.0025	0.029	0.0025	0.033	0.0025	0.038	0.0025	0.034	0.0025	0.030	0.0025	0.082
Mercury	0.002	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND
Nickel	0.1	0.0020	ND	0.0020	ND	0.010	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	0.0022	0.0020	ND	0.0020	ND
Nitrogen/Nitrate	10.0	0.10	ND	0.10	ND	0.10	0.26	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	0.63	0.10	0.10
Nitrogen/Nitrate, Nit	NA	0.10	ND	0.10	ND	0.10	0.10	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND^	0.10	ND ^	0.10	0.82	0.10	0.20
Nitrogen/Nitrite	NA	0.020	ND	0.020	0.048	0.020	0.16	0.020	ND	0.020	ND	0.020	ND	0.020	0.052	0.020	0.026	0.020	ND	0.040	0.19	0.020	0.099
Perchlorate	0.0049	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.004	ND	0.004	ND ^	0.0040	ND
Selenium	0.05	0.0025	0.0062	0.0025	0.0028	0.013	ND	0.0025	0.011	0.0025	ND	0.0025	ND	0.0025	0.0034	0.0025	0.014	0.0025	0.0057	0.0025	0.0075	0.0025	0.0071
Silver	0.05	0.00050	ND	0.00050	ND	0.0025	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Sulfate	400.0	100	500	100	540	100	570	100	420	100	440	100	380	100	450	100	550	100	360	100	370	100	360
Thallium	0.002	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Total Dissolved Soli	1,200	10	990	10	1100	10	1200	10	870	10	880	10	900	10	770	10	890	10	820	10	840	10	880
Vanadium	0.049	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.0050	ND	0.0050	0.011	0.0050	ND
Zinc	5.0	0.020	ND	0.020	ND	0.10	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND
Benzene	0.005	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.0005	ND	0.0005	ND	0.00050	ND
BETX	11.705	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.0025	ND	0.0025	ND	0.0025	ND
pH	6.5 - 9.0	NA	8.89	NA	9.65	NA	9.27	NA	9.44	NA	8.82	NA	9.39	NA	9.07	NA	9.17	NA	9.18	NA	8.22	NA	8.41
Temperature	NA	NA	14.59	NA	10.01	NA	13.63	NA	16.28	NA	14.24	NA	10.74	NA	18.03	NA	18.96	NA	14.00	NA	10.00	NA	15.89
Conductivity	NA	NA	1.64	NA	1.63	NA	1.69	NA	1.11	NA	1.05	NA	0.92	NA	1.04	NA	1.21	NA	0.99	NA	0.97	NA	1.19
Dissolved Oxygen	NA	NA	NM	NA	0.54	NA	0.12	NA	0.06	NA	0.13	NA	3.47	NA	3.06	NA	0.01	NA	0.36	NA	3.48	NA	0.37
ORP	NA	NA	NM	NA	-239.1	NA	54.4	NA	-305	NA	-241	NA	-50	NA	-106	NA	-134	NA	-174	NA	175.2	NA	-14.3

Sample: MW-06	Date	8/14/2013		10/28/2013		2/13/2014		5/20/2014		8/12/2014		10/20/2014		2/3/2015		4/30/2015		7/28/2015		11/10/2015		2/18/2016		5/26/2016	
Parameter	Standards	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result
Antimony	0.006	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND
Arsenic	0.010	0.0010	0.0022	0.0010	0.0031	0.0010	ND	0.0010	ND	0.0010	0.0018	0.0010	0.0017	0.0010	0.0028	0.0010	0.0010	0.0010	ND	0.0010	0.0017	0.0010	ND	0.0010	0.0022
Barium	2.0	0.0025	0.053	0.0025	0.063	0.0025	0.052	0.0025	0.045	0.0025	0.039	0.0025	0.066	0.0025	0.071	0.0025	0.072	0.0025	0.061	0.0025	0.044	0.0025	0.062	0.0025	0.075
Beryllium	0.004	0.0010	ND	0.0010	ND	0.0010	ND^	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND
Boron	2.0	0.50	2.9	0.10	3.7	0.50	3.0	0.50	2.9	0.25	2.8	0.50	3.4	1.0	3.2	0.25	3.0	0.50	3.6	0.50	3.4	0.050	2.4	0.050	2.9
Cadmium	0.005	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Chloride	200.0	10	91	10	76	2.0	55	10	120	10	120	10	81	2.0	49	10	160	10	120	10	110	10	150	10	83
Chromium	0.1	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND
Cobalt	1.0	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND
Copper	0.65	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Cyanide	0.2	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND
Fluoride	4.0	0.10	0.57	0.10	0.57	0.10	0.45	0.10	0.42	0.10	0.96	0.10	0.56	0.10	0.37	0.10	0.38	0.10	0.45	0.10	0.63	0.10	0.45	0.10	0.38
Iron	5.0	0.10	ND	0.10	ND	0.10	0.11	0.10	ND	0.10	ND	0.10	ND	0.10	0.17	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND
Lead	0.0075	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Manganese	0.15	0.0025	0.023	0.0025	0.083	0.0025	0.099	0.0025	0.056	0.0025	0.028	0.0025	0.11	0.0025	0.12	0.0025	0.068	0.0025	0.066	0.0025	0.037	0.0025	0.051	0.0025	0.089
Mercury	0.002	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND
Nickel	0.1	0.0020	ND	0.0020	0.0020	0.0020	0.0020	0.0020	ND	0.0020	ND	0.0020	0.0020	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	0.0022	0.0020	ND
Nitrogen/Nitrate	10.0	0.10	ND	0.10	ND	0.10	ND	0.10	0.72	0.10	ND	0.10	ND	0.10	ND	0.10	0.23	0.10	ND	0.10	ND	0.10	ND	0.10	ND
Nitrogen/Nitrate, Nit	NA	0.10	ND	0.10	ND	0.10	ND	0.10	0.91	0.10	0.16	0.10	ND	0.10	ND	0.10	0.30	0.10	ND	0.10	ND	0.10	0.14	0.10	ND
Nitrogen/Nitrite	NA	0.020	ND	0.020	ND	0.020	ND	0.020	0.19	0.10	0.29	0.020	ND	0.020	ND	0.020	0.067	0.020	0.077	0.020	0.032	0.020	0.047	0.020	ND
Perchlorate	0.0049	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND
Selenium	0.05	0.0025	0.0040	0.0025	ND	0.0025	0.0041	0.0025	0.0057	0.0025	0.0036	0.0025	0.0036	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	0.0048	0.0025	ND	0.0025	ND
Silver	0.05	0.00050	ND ^	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Sulfate	400.0	100	400	100	310	100	270	100	320	100	200	100	420	50	310	50	350	100	330	50	360	50	290	100	350
Thallium	0.002	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Total Dissolved Soli	1,200	10	860	10	790	10	780	10	840	10	660	10	800	10	770	10	780	10	800	10	660	10	720	10	780
Vanadium	0.049	0.0050	0.0087	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	0.014	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	0.0058	0.0050	ND
Zinc	5.0	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND
Benzene	0.005	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.0005	0.0005	0.0005	ND	0.00050	ND
BETX	11.705	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	0.0028	0.0025	ND	0.0025	ND
pH	6.5 - 9.0	NA	9.13	NA	8.50	NA	8.27	NA	8.52	NA	8.16	NA	7.26	NA	8.38	NA	8.08	NA	8.60	NA	8.63	NA	8.58	NA	7.79
Temperature	NA	NA	18.56	NA	15.76	NA	9.46	NA	16.13	NA	16.21	NA	18.31	NA	8.28	NA	10.95	NA	25.89	NA	17.67	NA	7.76	NA	16.74
Conductivity	NA	NA	1.04	NA	0.96	NA	0.57	NA	1.08	NA	1.00	NA	1.20	NA	0.77	NA	0.935	NA	1.289	NA	0.978	NA	0.63	NA	0.99
Dissolved Oxygen	NA	NA	0.37	NA	0.23	NA	1.19	NA	0.32	NA	0.62	NA	0.66	NA	1.69	NA	1.90	NA	0.88	NA	1.67	NA	1.57	NA	4.37
ORP	NA	NA	-16.6	NA	-173.8	NA	35.4	NA	-94.2	NA	-3.7	NA	-94.0	NA	-142.5	NA	-61.3	NA	-132.5	NA	-101.6	NA	-33.1	NA	-67.5

Sample: MW-06	Date	8/11/2016		10/26/2016		2/1/2017		5/11/2017		9/7/2017		11/16/2017		2/28/2018		5/3/2018		7/25/2018		10/3/2018		2/20/2019	
Parameter	Standards	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result
Antimony	0.006	0.0030	ND	0.0030	ND	0.0030	ND ^	0.0030	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND
Arsenic	0.010	0.0010	0.0029	0.0010	0.0031	0.0020	ND	0.0010	0.0011	0.001	0.0027	0.001	0.0024	0.001	0.0024	0.001	0.0022	0.001	0.0034	0.001	0.0032	0.001	0.002
Barium	2.0	0.0025	0.087	0.0025	0.084	0.0025	0.056	0.0025	0.055	0.0025	0.078	0.0025	0.076	0.0025	0.076	0.0025	0.078	0.0025	0.086	0.0025	0.085	0.0025	0.076
Beryllium	0.004	0.0010	ND	0.0010	ND^	0.0010	ND	0.0010	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND
Boron	2.0	0.25	3.6	0.50	3.9	0.25	2.9	0.50	3.0 F1	0.5	3.6	0.5	3.7	0.5	3.7	0.05	3.0	0.5	3.7	0.95	7.1	0.95	2.9
Cadmium	0.005	0.00050	ND	0.00050	ND	0.00050	ND ^	0.00050	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Chloride	200.0	2.0	61	2.0	73	10	90	10	89	2	66	2	55	2	55	2	53	2	48	2	47	2	53
Chromium	0.1	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND
Cobalt	1.0	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND
Copper	0.65	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND
Cyanide	0.2	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND
Fluoride	4.0	0.10	0.34	0.10	0.39	0.10	0.41	0.10	0.30	0.1	0.39	0.1	0.37	0.1	0.37	0.1	0.27	0.1	0.29	0.1	0.32	0.1	0.26
Iron	5.0	0.10	0.11	0.10	0.15	0.10	ND	0.10	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	0.2	0.1	0.23	0.1	0.15
Lead	0.0075	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Manganese	0.15	0.0025	0.13 B	0.0025	0.13	0.0025	0.062	0.0025	0.049	0.0025	0.087	0.0025	0.13	0.0025	0.13	0.0025	0.12	0.0025	0.13	0.0025	0.12	0.0025	0.12
Mercury	0.002	0.00020	ND	0.00020	ND	0.00020	ND ^	0.00020	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND
Nickel	0.1	0.0020	0.0024	0.0020	0.0039	0.0020	ND	0.0020	ND	0.002	ND	0.002	0.002	0.002	0.002	0.002	ND	0.002	ND	0.002	ND	0.002	0.0021
Nitrogen/Nitrate	10.0	0.10	ND	0.10	ND	0.10	0.14	0.10	0.60	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND
Nitrogen/Nitrate, Nit	NA	0.10	ND	0.10	ND	0.10	0.18	0.10	0.75	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND
Nitrogen/Nitrite	NA	0.020	ND	0.020	ND	0.020	0.039	0.040	0.15	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND
Perchlorate	0.0049	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND
Selenium	0.05	0.0025	ND	0.0025	0.0028	0.0050	ND	0.0025	0.0047	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND
Silver	0.05	0.00050	ND	0.00050	ND	0.00050	ND ^	0.00050	ND	0.0005	ND	0.0005	ND ^	0.0005	ND ^	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Sulfate	400.0	100	360	50	320	50	260	50	280	50	350	100	280	100	280	100	340	100	230	100	210	100	250
Thallium	0.002	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND
Total Dissolved Soli	1,200	10	810	10	750	10	750	10	650	10	700	10	800	10	800	10	720	10	760	10	740	10	730
Vanadium	0.049	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND
Zinc	5.0	0.020	ND	0.020	ND	0.020	ND ^	0.020	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND
Benzene	0.005	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.0005	ND	0.0005	0.00058	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
BETX	11.705	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	0.00278	0.0025	0.0012	0.0025	0.00054	0.0025	ND	0.0025	0.0025	0.0025	ND
pH	6.5 - 9.0	NA	7.74	NA	8.16	NA	7.88	NA	8.68	NA	8.2	NA	7.59	NA	7.3	NA	6.91	NA	7.47	NA	7.83	NA	7.8
Temperature	NA	NA	20.61	NA	13.77	NA	10.00	NA	14.88	NA	17.40	NA	12.60	NA	13.06	NA	14.41	NA	18.43	NA	19.92	NA	10.70
Conductivity	NA	NA	1.10	NA	0.94	NA	0.80	NA	0.83	NA	0.91	NA	0.84	NA	0.864	NA	0.082	NA	0.842	NA	0.910	NA	1.120
Dissolved Oxygen	NA	NA	2.23	NA	1.84	NA	3.40	NA	2.82	NA	0.71	NA	1.91	NA	2.04	NA	2.53	NA	1.81	NA	6.47	NA	0.10
ORP	NA	NA	-125.1	NA	-78.4	NA	-78.4	NA	-81.3	NA	-39.9	NA	-108.1	NA	-52.5	NA	33.4	NA	-88.6	NA	-43.3	NA	-97.1

Sample: MW-06	Date	5/29/2019		8/21/2019		12/6/2019		2/19/2020		5/22/2020		8/5/2020		11/3/2020		2/23/2021		5/24/2021		8/24/2021		11/23/2021	
Parameter	Standards	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result
Antimony	0.006	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND
Arsenic	0.010	0.001	0.0018	0.001	0.0032	0.001	0.0028	0.001	0.002	0.001	ND	0.001	0.0028	0.001	0.0022	0.001	0.001	0.001	ND	0.001	0.0019	0.001	0.0012
Barium	2.0	0.0025	0.1	0.0025	0.082	0.0025	0.087	0.0025	0.08	0.0025	0.072	0.0025	0.084	0.0025	0.083	0.0025	0.073	0.0025	0.078	0.0025	0.089	0.0025	0.082
Beryllium	0.004	0.001	ND	0.001	ND ^	0.001	ND	0.001	ND ^	0.001	ND	0.001	ND	0.001	ND ^	0.001	ND ^	0.001	ND	0.001	ND	0.001	ND
Boron	2.0	0.95	3.8	0.95	3.2	0.95	7.3	0.95	3.1	0.95	3.2	0.25	3.1	0.5	3.4	0.5	2.8	0.5	2.5	0.5	2.9	0.5	2.9
Cadmium	0.005	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Chloride	200.0	2	37	2	39	2	30	2	25	2	58	2	50	2	42	2	31	2	46	2	45	2	42
Chromium	0.1	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND
Cobalt	1.0	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND
Copper	0.65	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND
Cyanide	0.2	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND
Fluoride	4.0	0.1	0.21	0.1	0.28	0.1	0.33	0.1	0.29	0.1	0.3	0.1	0.31	0.1	0.35	0.1	0.33	0.1	0.32	0.1	0.33	0.1	0.36
Iron	5.0	0.1	ND	0.1	0.3	0.1	0.12	0.1	0.15	0.1	ND	0.1	0.24	0.1	0.47	0.1	0.33	0.1	0.1	0.1	0.23	0.1	0.21
Lead	0.0075	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Manganese	0.15	0.0025	0.11	0.0025	0.14	0.0025	0.13	0.0025	0.14	0.0025	0.14	0.0025	0.18	0.0025	0.23	0.0025	0.24	0.0025	0.24	0.0025	0.23	0.0025	0.25
Mercury	0.002	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND
Nickel	0.1	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	0.0025	0.002	ND
Nitrogen/Nitrate	10.0	0.1	0.31	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND
Nitrogen/Nitrate, Nit	NA	0.1	0.31	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND
Nitrogen/Nitrite	NA	0.02	ND	0.02	ND	0.02	ND H3	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND ^1+	0.02	ND
Perchlorate	0.0049	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND
Selenium	0.05	0.0025	0.045	0.0025	ND	0.0025	0.004	0.0025	0.012	0.0025	0.011	0.0025	ND	0.0025	0.004	0.0025	0.0086	0.0025	ND	0.0025	0.0099	0.0025	ND
Silver	0.05	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Sulfate	400.0	100	410	100	230	100	250	100	ND	100	280	100	200	25	160	25	150	100	150	100	160	25	150
Thallium	0.002	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND
Total Dissolved Soli	1,200	10	1200	10	720	10	760	10	740	10	710	30	640	30	710	10	580 H	10	620	10	520	10	620
Vanadium	0.049	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND
Zinc	5.0	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND
Benzene	0.005	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
BETX	11.705	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND
pH	6.5 - 9.0	NA	7.51	NA	7.83	NA	7.91	NA	7.81	NA	7.47	NA	7.58	NA	7.29	NA	7.79	NA	7.65	NA	7.09	NA	7.49
Temperature	NA	NA	11.60	NA	16.10	NA	14.10	NA	10.17	NA	11.20	NA	15.60	NA	16.50	NA	10.70	NA	12.90	NA	17.40	NA	15.60
Conductivity	NA	NA	1.590	NA	1.070	NA	1.029	NA	0.722	NA	1.170	NA	1.037	NA	1.090	NA	1.000	NA	1.000	NA	1.120	NA	1.036
Dissolved Oxygen	NA	NA	0.31	NA	0.36	NA	0.91	NA	1.89	NA	0.68	NA	NM	NA	0.18	NA	0.16	NA	0.23	NA	1.42	NA	0.28
ORP	NA	NA	-15.8	NA	-137.3	NA	-90.8	NA	-82.1	NA	-37.6	NA	-106.4	NA	-185.7	NA	-72.6	NA	104.4	NA	-119.5	NA	71.3

Notes: Standards obtained from IAC, Title 35, Chapter I, Part 620, Subpart D, Section 620.410 - Groundwater Quality Standards for Class I: Potable Resource Groundwater.
All values are in mg/L (ppm) unless otherwise noted.

DL - Detection limit
NA - Not Applicable
ND - Not Detected

NM - Not Measured
NR - Not Required
NS - Not Sampled

Temperature °C degrees Celcius
Conductivity ms/cm^c millisiemens/centimeters
Dissolved Oxygen mg/L milligrams/liter
Oxygen Reduction Potential (ORP) mV millivolts

^ - Denotes instrument related QC exceeds the control limits
F1 - MS and/or MSD Recovery outside of limits
F2 - MS/MSD RPD exceeds control limits
H - Prepped/analyzed beyond the holding time

Attachment 9-3. Table. CCA Groundwater Analytical Results - Midwest Generation LLC, Will County Station, Romeoville, IL

Sample: MW-07	Date	12/13/2010		3/28/2011		6/15/2011		9/15/2011		12/8/2011		3/16/2012		6/20/2012		9/24/2012		12/18/2012		3/5/2013		5/22/2013	
Parameter	Standards	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result
Antimony	0.006	0.0030	ND^	0.0030	ND	0.015	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND
Arsenic	0.010	0.0010	0.0040	0.0010	0.0037	0.0050	ND	0.0010	0.0042	0.0010	0.0042	0.0010	0.0041	0.0010	0.0039	0.0010	0.0049	0.0010	0.0034	0.0010	0.0033	0.0010	0.0031
Barium	2.0	0.0025	0.045	0.0025	0.067	0.013	0.076	0.0025	0.082	0.0025	0.082	0.0025	0.069	0.0025	0.057	0.0025	0.086	0.0025	0.044	0.0025	0.041	0.0025	0.048
Beryllium	0.004	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND
Boron	2.0	0.25	4.7	1.0	5.0	1.0	5.7	0.25	3.4	0.050	5.0	0.25	5.1	0.50	5.6	0.25	5.5	0.50	5.1	0.50	4.3	0.50	2.6
Cadmium	0.005	0.00050	ND	0.00050	ND	0.0025	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Chloride	200.0	10	160	10	140	10	140	10	160	10	150	10	130	10	120	10	150	10	140	10	140	10	190
Chromium	0.1	0.0050	ND	0.0050	ND	0.025	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND
Cobalt	1.0	0.0010	ND	0.0010	ND	0.0050	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND
Copper	0.65	0.0020	ND	0.0020	ND	0.010	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Cyanide	0.2	0.010	ND	0.010	ND	0.010	0.016	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	0.017	0.010	ND	0.010	0.014
Fluoride	4.0	0.10	0.96	0.10	0.77	0.10	0.71	0.10	0.82	0.10	0.86	0.10	0.76	0.10	0.83	0.10	ND	0.10	0.89 ^	0.10	0.92 ^	0.10	0.97
Iron	5.0	0.10	0.23	0.10	0.18	0.50	ND	0.10	0.37	0.10	0.50	0.10	0.57	0.10	0.60	0.10	0.51	0.10	0.62	0.10	0.47	0.10	0.21
Lead	0.0075	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Manganese	0.15	0.0025	0.12	0.0025	0.11	0.013	0.15	0.0025	0.18	0.0025	0.20	0.0025	0.20	0.0025	0.19	0.0025	0.19	0.0025	0.19	0.0025	0.15	0.0025	0.043
Mercury	0.002	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND
Nickel	0.1	0.0020	0.0029	0.0020	0.0023	0.010	ND	0.0020	0.0024	0.0020	0.0021	0.0020	ND	0.0020	0.0020	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	0.0036
Nitrogen/Nitrate	10.0	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND
Nitrogen/Nitrate, Nit	NA	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND^	0.10	ND ^	0.10	ND	0.10	ND
Nitrogen/Nitrite	NA	0.020	ND	0.020	0.077	0.020	0.035	0.020	0.050	0.020	0.043	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND
Perchlorate	0.0049	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.004	ND	0.004	ND ^	0.0040	ND
Selenium	0.05	0.0025	ND	0.0025	ND	0.013	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	0.0068	0.0025	ND
Silver	0.05	0.00050	ND	0.00050	ND	0.0025	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Sulfate	400.0	100	610	250	650	200	1000	100	710	130	710	100	770	100	670	100	600	100	480	100	400	100	390
Thallium	0.002	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Total Dissolved Soli	1,200	10	1300	10	1500	10	1600	10	1400	10	1300	10	1400	10	1300	10	1200	10	1200	10	1000	10	1100
Vanadium	0.049	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.0050	ND	0.0050	0.0055	0.0050	ND
Zinc	5.0	0.020	ND	0.020	ND	0.10	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND
Benzene	0.005	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.0005	ND	0.0005	ND	0.00050	ND
BETX	11.705	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.0025	ND	0.0025	ND	0.0025	ND
pH	6.5 - 9.0	NA	8.61	NA	8.79	NA	8.13	NA	7.91	NA	7.69	NA	8.16	NA	7.92	NA	8.02	NA	7.75	NA	8.08	NA	8.14
Temperature	NA	NA	14.84	NA	11.80	NA	14.23	NA	15.96	NA	15.17	NA	14.21	NA	15.67	NA	17.28	NA	14.37	NA	12.00	NA	14.25
Conductivity	NA	NA	1.96	NA	2.12	NA	2.08	NA	1.61	NA	1.55	NA	1.43	NA	1.44	NA	1.46	NA	1.33	NA	1.20	NA	1.13
Dissolved Oxygen	NA	NA	NM	NA	0.43	NA	0.08	NA	0.05	NA	2.54	NA	0.02	NA	0.41	NA	0.20	NA	0.15	NA	0.17	NA	0.36
ORP	NA	NA	NM	NA	-277.2	NA	-135.2	NA	-301	NA	-210	NA	-189	NA	-161	NA	-171	NA	-150	NA	-219.9	NA	-155.1

Sample: MW-07	Date	8/15/2013		10/29/2013		2/20/2014		5/20/2014		8/12/2014		10/21/2014		2/3/2015		4/30/2015		7/27/2015		11/9/2015		2/17/2016	
Parameter	Standards	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result
Antimony	0.006	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND
Arsenic	0.010	0.0010	0.0032	0.0010	0.0035	0.0010	0.0030	0.0010	0.0022	0.0010	0.0035	0.0010	0.0031	0.0010	0.0027	0.0010	0.0029	0.0010	0.0020	0.0010	0.0027	0.0010	0.0023
Barium	2.0	0.0025	0.067	0.0025	0.040	0.0025	0.064	0.0025	0.074	0.0025	0.062	0.0025	0.072	0.0025	0.042	0.0025	0.048	0.0025	0.037	0.0025	0.035	0.0025	0.046
Beryllium	0.004	0.0010	ND	0.0010	ND	0.0010	ND^	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND
Boron	2.0	0.50	3.5	0.10	3.0	0.50	4.0	0.50	4.8	0.50	3.9	0.50	5.1	1.0	3.0	0.25	3.3	0.25	3.1	0.50	2.9	0.050	3.8
Cadmium	0.005	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Chloride	200.0	10	180	10	180	10	210	10	190	10	200	10	190	10	170	10	160	10	170	10	160	10	150
Chromium	0.1	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND
Cobalt	1.0	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND
Copper	0.65	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Cyanide	0.2	0.010	0.013	0.010	0.012	0.010	0.019	0.010	0.029	0.010	0.021	0.010	ND	0.010	0.016	0.010	ND	0.010	ND	0.010	0.034	0.010	ND
Fluoride	4.0	0.10	0.96	0.10	0.96	0.10	0.81	0.10	0.73	0.10	0.97	0.10	0.84	0.10	0.91	0.10	0.85	0.10	0.90	0.10	0.96	0.10	0.79
Iron	5.0	0.10	0.36	0.10	0.21	0.10	0.36	0.10	0.53	0.10	0.44	0.10	0.55	0.10	0.16	0.10	0.22	0.10	0.19	0.10	0.19	0.10	0.17
Lead	0.0075	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Manganese	0.15	0.0025	0.064	0.0025	0.049	0.0025	0.16	0.0025	0.12	0.0025	0.10	0.0025	0.12	0.0025	0.031	0.0025	0.044	0.0025	0.024	0.0025	0.025	0.0025	0.040
Mercury	0.002	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND
Nickel	0.1	0.0020	0.0038	0.0020	0.0042	0.0020	0.0032	0.0020	0.0027	0.0020	0.0037	0.0020	0.0034	0.0020	0.0036	0.0020	0.0033	0.0020	0.0034	0.0020	0.0035	0.0020	0.0040
Nitrogen/Nitrate	10.0	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND
Nitrogen/Nitrate, Nit	NA	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND
Nitrogen/Nitrite	NA	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND
Perchlorate	0.0049	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND
Selenium	0.05	0.0025	ND	0.0025	ND	0.0025	0.0066	0.0025	ND	0.0025	ND	0.0025	0.0046	0.0025	ND	0.0025	0.0039	0.0025	ND	0.0025	0.012	0.0025	0.0039
Silver	0.05	0.00050	ND ^	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Sulfate	400.0	100	460	100	530	130	380	100	540	100	570	130	680	100	400	100	440	100	420	100	420	200	700
Thallium	0.002	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Total Dissolved Soli	1,200	10	1100	10	1200	10	1300	10	1300	10	1300	10	1500	10	1100	10	1200	10	950	10	960	10	1300
Vanadium	0.049	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND
Zinc	5.0	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND
Benzene	0.005	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.0005	ND	0.0005	ND
BETX	11.705	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	0.0018	0.0025	ND
pH	6.5 - 9.0	NA	8.43	NA	8.07	NA	8.18	NA	8.22	NA	8.26	NA	7.88	NA	8.68	NA	8.53	NA	8.75	NA	7.11	NA	8.36
Temperature	NA	NA	15.62	NA	13.06	NA	11.16	NA	16.71	NA	14.78	NA	14.85	NA	8.76	NA	12.23	NA	20.84	NA	14.48	NA	10.48
Conductivity	NA	NA	1.21	NA	1.20	NA	1.20	NA	1.50	NA	1.24	NA	1.60	NA	1.10	NA	1.32	NA	1.49	NA	1.21	NA	1.00
Dissolved Oxygen	NA	NA	0.10	NA	0.41	NA	0.94	NA	0.57	NA	0.28	NA	0.39	NA	1.50	NA	2.30	NA	2.23	NA	2.36	NA	0.91
ORP	NA	NA	-204.2	NA	-168.1	NA	-118.7	NA	-76.6	NA	-126.7	NA	-151.3	NA	-154.5	NA	-134.3	NA	-163.1	NA	-69.7	NA	-123.3

Sample: MW-07	Date	5/24/2016		8/9/2016		10/25/2016		1/31/2017		5/9/2017		9/7/2017		11/14/2017		2/27/2018		5/1/2018		7/25/2018		10/2/2018	
Parameter	Standards	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result
Antimony	0.006	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND ^	0.0030	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND
Arsenic	0.010	0.0010	0.0024	0.0010	0.0028	0.0010	0.0025	0.0020	0.0033	0.0010	0.0024	0.001	0.0031	0.001	0.0047	0.001	0.0047	0.001	0.0014	0.001	0.002	0.001	0.002
Barium	2.0	0.0025	0.046	0.0025	0.048	0.0025	0.046	0.0025	0.045	0.0025	0.061	0.0025	0.057	0.0025	0.08	0.0025	0.08	0.0025	0.05	0.0025	0.04	0.0025	0.036
Beryllium	0.004	0.0010	ND	0.0010	ND	0.0010	ND^	0.0010	ND	0.0010	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND
Boron	2.0	0.050	2.9	0.25	2.8	0.50	3.2	0.50	3.7	0.50	4.3	0.5	3.4	1	8.0	1	8.0	0.05	3.3	0.5	2.9	0.25	2.6
Cadmium	0.005	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Chloride	200.0	10	140	10	150	10	130	10	130	10	150	10	160	10	180	10	180	10	130	10	150	10	160
Chromium	0.1	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND
Cobalt	1.0	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.001	ND	0.001	0.0013	0.001	0.0013	0.001	ND	0.001	ND	0.001	ND
Copper	0.65	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND
Cyanide	0.2	0.010	0.037	0.010	0.017 F1,2	0.010	0.021	0.010	0.011	0.010	0.025	0.01	0.028	0.01	ND	0.01	ND	0.01	0.017	0.01	0.024	0.01	ND
Fluoride	4.0	0.10	0.75	0.10	0.86	0.10	0.87	0.10	0.72	0.10	0.39	0.1	0.71	0.1	0.33	0.1	0.33	0.1	0.69	0.1	0.77	0.1	0.82
Iron	5.0	0.10	0.21	0.10	0.28	0.10	0.31	0.10	0.28	0.10	0.39	0.1	0.37	0.1	1.5	0.1	1.5	0.1	0.17	0.1	0.12	0.1	ND
Lead	0.0075	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Manganese	0.15	0.0025	0.035	0.0025	0.044 B	0.0025	0.061	0.0025	0.081	0.0025	0.10	0.0025	0.087	0.0025	0.42	0.0025	0.42	0.0025	0.038	0.0025	0.013	0.0025	0.012
Mercury	0.002	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND
Nickel	0.1	0.0020	0.0034	0.0020	0.0035	0.0020	0.0035	0.0020	0.0030	0.0020	0.0023	0.002	0.0028	0.002	0.0022	0.002	0.0022	0.002	0.0024	0.002	0.0029	0.002	0.0026
Nitrogen/Nitrate	10.0	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	0.22
Nitrogen/Nitrate, Nit	NA	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	0.22
Nitrogen/Nitrite	NA	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND
Perchlorate	0.0049	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND
Selenium	0.05	0.0025	0.0028	0.0025	0.0027	0.0025	0.0061	0.0050	ND	0.0025	0.0029	0.0025	0.026	0.0025	0.0038	0.0025	0.0038	0.0025	0.0085	0.0025	ND	0.0025	0.0095
Silver	0.05	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Sulfate	400.0	100	530	100	350	100	510	100	500	250	540	100	540	250	890	250	890	100	590	100	360	100	340
Thallium	0.002	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND
Total Dissolved Soli	1,200	10	1100	10	940	10	1200	10	1500	10	1500	10	1200	10	2200	10	2200	10	1200	10	950	10	970
Vanadium	0.049	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND
Zinc	5.0	0.020	ND	0.020	ND	0.020	ND	0.020	ND ^	0.020	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND
Benzene	0.005	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.0005	ND	0.0005	0.0006	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
BETX	11.705	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	0.00508	0.0025	0.0014	0.0025	ND	0.0025	ND	0.0025	0.0052
pH	6.5 - 9.0	NA	7.89	NA	7.60	NA	8.20	NA	7.73	NA	7.51	NA	7.75	NA	6.98	NA	7.75	NA	7.37	NA	7.06	NA	7.81
Temperature	NA	NA	15.41	NA	17.85	NA	13.94	NA	9.87	NA	11.32	NA	14.90	NA	13.21	NA	12.94	NA	17.02	NA	16.51	NA	14.85
Conductivity	NA	NA	1.37	NA	1.30	NA	1.27	NA	1.27	NA	1.19	NA	1.27	NA	2.08	NA	1.199	NA	1.264	NA	1.159	NA	1.206
Dissolved Oxygen	NA	NA	1.53	NA	1.20	NA	1.16	NA	2.37	NA	5.98	NA	0.33	NA	2.20	NA	1.81	NA	2.02	NA	2.47	NA	2.20
ORP	NA	NA	-126.9	NA	-108.9	NA	-86.1	NA	-70.7	NA	-73.9	NA	-112.2	NA	-109.8	NA	-102.3	NA	-3.1	NA	-134.3	NA	-116.2

Sample: MW-07	Date	2/19/2019		5/28/2019		8/21/2019		12/6/2019		2/18/2020		5/26/2020		8/6/2020		11/3/2020		3/1/2021		5/24/2021		8/25/2021		11/19/2021	
Parameter	Standards	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result
Antimony	0.006	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND
Arsenic	0.010	0.001	0.0018	0.001	0.0019	0.001	0.0029	0.001	0.0029	0.001	0.0021	0.001	ND	0.001	0.0026	0.001	0.0025	0.001	0.0021	0.001	0.0014	0.001	0.002	0.001	0.0045
Barium	2.0	0.0025	0.069	0.0025	0.045	0.0025	0.079	0.0025	0.057	0.0025	0.047	0.0025	0.039	0.0025	0.071	0.0025	0.079	0.0025	0.084	0.0025	0.062	0.0025	0.067	0.0025	0.061
Beryllium	0.004	0.001	ND	0.001	ND	0.001	ND ^	0.001	ND	0.001	ND ^	0.001	ND	0.001	ND	0.001	ND ^	0.001	ND	0.001	ND	0.001	ND	0.001	ND
Boron	2.0	0.25	3.5	0.25	3.0	0.25	4.3	0.25	ND	0.25	5.7	0.25	4.4	0.5	3.8	1	4.5	1	4.1	1	3.7	0.5	3.1	1	5.9
Cadmium	0.005	0.0005	0.0005	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Chloride	200.0	10	140	10	100	10	120	10	72	10	65	10	130	10	140	10	160	10	140	10	110	10	140	20	210
Chromium	0.1	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND
Cobalt	1.0	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	0.0019
Copper	0.65	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND
Cyanide	0.2	0.01	0.011	0.01	0.03	0.01	0.018	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	0.012	0.005	0.017	0.005	0.02	0.005	ND	0.005	0.0063
Fluoride	4.0	0.1	0.56	0.1	0.68	0.1	0.63	0.1	0.49	0.1	0.47	0.1	0.61	0.1	0.67	0.1	0.68	0.1	0.56	0.1	0.69	0.1	0.66	0.1	0.38
Iron	5.0	0.1	0.48	0.1	0.13	0.1	0.58	0.1	0.59	0.1	0.42	0.1	0.42	0.1	0.87	0.1	1.4	0.1	1.3	0.1	0.46	0.1	0.63	0.1	3.3
Lead	0.0075	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Manganese	0.15	0.0025	0.22	0.0025	0.068	0.0025	0.19	0.0025	0.43	0.0025	0.48	0.0025	0.45	0.0025	0.14	0.0025	0.23	0.0025	0.31	0.0025	0.2	0.0025	0.091	0.0025	2.2
Mercury	0.002	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND
Nickel	0.1	0.002	0.003	0.002	0.0025	0.002	0.0036	0.002	0.0026	0.002	0.0023	0.002	0.0026	0.002	0.0026	0.002	0.0028	0.002	0.0027	0.002	0.0023	0.002	0.0037	0.002	0.0029
Nitrogen/Nitrate	10.0	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	0.15	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	0.21	0.1	ND
Nitrogen/Nitrate, Nit	NA	0.1	ND	0.1	ND ^	0.1	ND	0.1	ND	0.1	0.15	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	0.21	0.1	ND
Nitrogen/Nitrite	NA	0.02	ND	0.02	ND	0.02	ND	0.02	ND H3	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND
Perchlorate	0.0049	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.008	ND
Selenium	0.05	0.0025	0.0032	0.0025	0.0032	0.0025	0.0057	0.0025	0.0032	0.0025	0.012	0.0025	ND	0.0025	ND	0.0025	0.0089	0.0025	0.0098	0.0025	0.0079	0.0025	0.0086	0.0025	0.038
Silver	0.05	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Sulfate	400.0	100	600	100	460	100	600	100	820	100	770	100	620	100	540	100	540	100	680	100	530	100	460	100	730
Thallium	0.002	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND
Total Dissolved Soli	1,200	10	1500	10	1300	10	1400	10	1800	10	1500	10	1400	60	1200	60	1300	10	1500	10	1100	10	810	10	2100
Vanadium	0.049	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND
Zinc	5.0	0.02	ND	0.02	ND	0.02	ND	0.02	0.02	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND
Benzene	0.005	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
BETX	11.705	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND
pH	6.5 - 9.0	NA	7.58	NA	8.65	NA	7.54	NA	6.97	NA	8.42	NA	7.08	NA	7.28	NA	7.08	NA	7.21	NA	8.38	NA	8.63	NA	6.62
Temperature	NA	NA	11.70	NA	11.50	NA	14.00	NA	13.70	NA	11.50	NA	11.90	NA	13.70	NA	14.90	NA	11.30	NA	12.50	NA	16.10	NA	14.60
Conductivity	NA	NA	1.785	NA	1.490	NA	1.415	NA	2.383	NA	2.520	NA	1.617	NA	1.535	NA	1.866	NA	1.894	NA	1.507	NA	1.829	NA	2.770
Dissolved Oxygen	NA	NA	0.02	NA	0.48	NA	NM	NA	0.89	NA	0.17	NA	0.68	NA	NM	NA	1.70	NA	0.01	NA	0.29	NA	0.63	NA	0.25
ORP	NA	NA	-90.7	NA	-65.3	NA	-191.7	NA	-76.0	NA	-3.9	NA	-25.4	NA	-109.7	NA	-132.8	NA	-118.3	NA	53.7	NA	-234.8	NA	-26.0

Notes: Standards obtained from IAC, Title 35, Chapter I, Part 620, Subpart D, Section 620.410 - Groundwater Quality Standards for Class I: Potable Resource Groundwater.
All values are in mg/L (ppm) unless otherwise noted.

DL - Detection limit
NA - Not Applicable
ND - Not Detected

NM - Not Measured
NR - Not Required
NS - Not Sampled

Temperature	°C	degrees Celcius
Conductivity	ms/cm^c	millisiemens/centimeters
Dissolved Oxygen	mg/L	milligrams/liter
Oxygen Reduction Potential (ORP)	mV	millivolts

^ - Denotes instrument related QC exceeds the control limits
F1 - MS and/or MSD Recovery outside of limits
F2 - MS/MSD RPD exceeds control limits
H - Prepped/analyzed beyond the holding time

Sample: MW-08	Date	12/13/2010		3/28/2011		6/15/2011		9/15/2011		12/8/2011		3/16/2012		6/20/2012		9/24/2012		12/18/2012		3/5/2013		5/23/2013	
Parameter	Standards	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result
Antimony	0.006	0.0030	ND^	0.0030	ND	0.015	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND
Arsenic	0.010	0.0010	0.0067	0.0010	0.0059	0.0050	0.0082	0.0010	0.014	0.0010	0.012	0.0010	0.0066	0.0010	0.013	0.0010	0.018	0.0010	0.0088	0.0010	0.0088	0.0010	0.0072
Barium	2.0	0.0025	0.069	0.0025	0.089	0.013	0.085	0.0025	0.099	0.0025	0.078	0.0025	0.066	0.0025	0.074	0.0025	0.090	0.0025	0.079	0.0025	0.069	0.0025	0.079
Beryllium	0.004	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND
Boron	2.0	0.25	1.7	0.25	1.3	0.050	1.7	0.050	2.3	0.050	1.9	0.25	1.5	0.50	2.0	0.25	2.6	0.50	2.1	0.50	1.8	0.50	1.9
Cadmium	0.005	0.00050	ND	0.00050	ND	0.0025	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Chloride	200.0	10	93	10	270	10	200	10	160	10	130	10	160	10	160	10	150	10	150	10	150	10	190
Chromium	0.1	0.0050	ND	0.0050	ND	0.025	ND	0.0050	ND	0.0050	ND	0.010	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND
Cobalt	1.0	0.0010	ND	0.0010	ND	0.0050	ND	0.0010	ND	0.0010	ND	0.0020	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND
Copper	0.65	0.0020	ND	0.0020	ND	0.010	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	0.0021
Cyanide	0.2	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND
Fluoride	4.0	0.10	0.61	0.10	0.55	0.10	0.57	0.10	0.64	0.10	0.61	0.10	0.52	0.10	0.60	0.10	0.65	0.10	0.58 ^	0.10	0.55 ^	0.10	0.55
Iron	5.0	0.10	0.48	0.10	0.38	0.50	0.76	0.10	0.46	0.10	0.68	0.20	ND	0.10	0.58	0.10	0.66	0.10	0.50	0.10	0.43	0.10	0.68
Lead	0.0075	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Manganese	0.15	0.0025	0.33	0.0025	0.44	0.013	0.47	0.0025	0.45	0.0025	0.40	0.0050	ND	0.0025	0.36	0.0025	0.41	0.0025	0.43	0.0025	0.33	0.0025	0.47
Mercury	0.002	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND
Nickel	0.1	0.0020	ND	0.0020	ND	0.010	ND	0.0020	0.0034	0.0020	0.0020	0.0040	ND	0.0020	0.0022	0.0020	0.0035	0.0020	0.0033	0.0020	0.0031	0.0020	ND
Nitrogen/Nitrate	10.0	0.10	ND	0.10	0.22	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	0.23	0.10	ND	0.10	ND
Nitrogen/Nitrate, Nit	NA	0.10	ND	0.10	0.22	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND^	0.10	0.23	0.10	ND	0.10	ND
Nitrogen/Nitrite	NA	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND
Perchlorate	0.0049	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.004	ND	0.004	ND ^	0.0040	ND
Selenium	0.05	0.0025	ND	0.0025	ND	0.013	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND
Silver	0.05	0.00050	ND	0.00050	ND	0.0025	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Sulfate	400.0	100	440	100	440	100	420	100	600	100	330	50	330	100	370	100	630	100	380	100	360	100	270
Thallium	0.002	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Total Dissolved Soli	1,200	10	930	10	1200	10	1100	10	1300	10	980	10	910	10	1000	10	1200	10	1200	10	1000	10	1100
Vanadium	0.049	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.0050	ND	0.0050	ND	0.0050	ND
Zinc	5.0	0.020	ND	0.020	ND	0.10	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND
Benzene	0.005	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.0005	ND	0.0005	ND	0.00050	ND
BETX	11.705	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.0025	ND	0.0025	ND	0.0025	ND
pH	6.5 - 9.0	NA	7.65	NA	8.17	NA	7.47	NA	7.30	NA	6.99	NA	7.61	NA	7.36	NA	7.31	NA	7.43	NA	7.87	NA	7.19
Temperature	NA	NA	12.82	NA	9.51	NA	13.28	NA	16.18	NA	14.05	NA	12.16	NA	15.28	NA	17.41	NA	13.82	NA	9.50	NA	13.12
Conductivity	NA	NA	1.43	NA	1.96	NA	1.76	NA	1.50	NA	1.13	NA	1.02	NA	1.23	NA	1.49	NA	1.27	NA	1.11	NA	1.09
Dissolved Oxygen	NA	NA	NM	NA	0.51	NA	0.50	NA	0.76	NA	0.32	NA	1.15	NA	0.66	NA	0.94	NA	0.29	NA	1.35	NA	0.20
ORP	NA	NA	NM	NA	-254.6	NA	-62.2	NA	-207	NA	-139	NA	-54	NA	-105	NA	-60	NA	-80	NA	-94.1	NA	-111.3

Sample: MW-08	Date	8/15/2013		10/28/2013		2/20/2014		5/20/2014		8/12/2014		10/21/2014		2/3/2015		4/30/2015		7/27/2015		11/9/2015		2/16/2016	
Parameter	Standards	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result
Antimony	0.006	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND
Arsenic	0.010	0.0010	0.016	0.0010	0.0069	0.0010	0.0077	0.0010	0.0036	0.0010	0.014	0.0010	0.0082	0.0010	0.0036	0.0010	0.0047	0.0010	0.0064	0.0010	0.0040	0.0010	0.0024
Barium	2.0	0.0025	0.084	0.0025	0.14	0.0025	0.086	0.0025	0.076	0.0025	0.078	0.0025	0.087	0.0025	0.081	0.0025	0.083	0.0025	0.066	0.0025	0.086	0.0025	0.060
Beryllium	0.004	0.0010	ND	0.0010	ND	0.0010	ND^	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND
Boron	2.0	0.50	2.4	0.10	3.2	0.25	2.0	0.50	2.5	0.25	2.4	0.50	2.8	1.0	2.3	0.25	2.3	0.25	2.8	0.50	4.0	0.050	2.8
Cadmium	0.005	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Chloride	200.0	10	170	10	150	10	180	10	160	10	170	10	180	10	170	10	150	10	170	10	170	10	140
Chromium	0.1	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND
Cobalt	1.0	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND
Copper	0.65	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Cyanide	0.2	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND
Fluoride	4.0	0.10	0.64	0.10	0.45	0.10	0.46	0.10	0.43	0.10	0.74	0.10	0.56	0.10	0.51	0.10	0.54	0.10	0.68	0.10	0.52	0.10	0.52
Iron	5.0	0.10	1.3	0.10	ND	0.10	0.72	0.10	0.43	0.10	1.0	0.10	1.0	0.10	0.19	0.10	0.22	0.10	0.46	0.10	0.11	0.10	0.12
Lead	0.0075	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Manganese	0.15	0.0025	0.31	0.0025	0.42	0.0025	0.39	0.0025	0.35	0.0025	0.30	0.0025	0.44	0.0025	0.31	0.0025	0.28	0.0025	0.31	0.0025	0.25	0.0025	0.24
Mercury	0.002	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND
Nickel	0.1	0.0020	0.0032	0.0020	0.0043	0.0020	0.0037	0.0020	0.0030	0.0020	0.0040	0.0020	0.0048	0.0020	0.0036	0.0020	0.0037	0.0020	0.0041	0.0020	0.0052	0.0020	0.0065
Nitrogen/Nitrate	10.0	0.10	ND	0.10	0.17	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND
Nitrogen/Nitrate, Nit	NA	0.10	ND	0.10	0.17	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND
Nitrogen/Nitrite	NA	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND
Perchlorate	0.0049	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND
Selenium	0.05	0.0025	ND	0.0025	0.015	0.0025	0.0034	0.0025	0.0032	0.0025	ND	0.0025	0.0032	0.0025	0.0083	0.0025	0.010	0.0025	ND	0.0025	0.0065	0.0025	0.0049
Silver	0.05	0.00050	ND ^	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Sulfate	400.0	100	440	130	650	130	330	100	450	100	430	200	730	100	530	100	520	100	650	200	800	250	750
Thallium	0.002	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Total Dissolved Soli	1,200	10	1100	10	1600	10	1300	10	1400	10	1200	10	1500	10	1400	10	1400	10	1200	10	1600	10	1600
Vanadium	0.049	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND
Zinc	5.0	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND
Benzene	0.005	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.0005	ND	0.0005	ND
BETX	11.705	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	0.0019	0.0025	ND
pH	6.5 - 9.0	NA	7.46	NA	6.87	NA	8.18	NA	7.04	NA	7.09	NA	7.03	NA	7.24	NA	7.23	NA	7.36	NA	6.88	NA	7.10
Temperature	NA	NA	18.25	NA	15.59	NA	9.15	NA	17.97	NA	16.04	NA	14.76	NA	9.43	NA	12.42	NA	17.57	NA	16.00	NA	7.88
Conductivity	NA	NA	1.35	NA	1.73	NA	1.26	NA	1.70	NA	1.49	NA	2.00	NA	1.46	NA	1.587	NA	1.657	NA	1.958	NA	1.23
Dissolved Oxygen	NA	NA	0.30	NA	0.64	NA	1.20	NA	0.44	NA	0.69	NA	0.68	NA	2.26	NA	5.61	NA	1.23	NA	1.81	NA	1.63
ORP	NA	NA	-114.8	NA	-145.3	NA	-86.8	NA	87.7	NA	-53.3	NA	-52.9	NA	10.7	NA	14.8	NA	-124.4	NA	19.0	NA	19.4

Sample: MW-08	Date	5/24/2016		8/9/2016		10/25/2016		1/31/2017		5/9/2017		9/6/2017		11/14/2017		2/27/2018		5/1/2018		7/25/2018		10/2/2018	
Parameter	Standards	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result
Antimony	0.006	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND ^	0.0030	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND
Arsenic	0.010	0.0010	0.0049	0.0010	0.0095	0.0010	0.0064	0.0020	ND	0.0010	ND	0.001	0.012	0.001	0.0063	0.001	0.0063	0.001	ND	0.001	0.0067	0.001	0.011
Barium	2.0	0.0025	0.064	0.0025	0.062	0.0025	0.063	0.0025	0.052	0.0025	0.059	0.0025	0.065	0.0025	0.084	0.0025	0.084	0.0025	0.06	0.0025	0.068	0.0025	0.064
Beryllium	0.004	0.0010	ND	0.0010	ND	0.0010	ND^	0.0010	ND	0.0010	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND
Boron	2.0	0.050	2.3	0.25	2.6	0.50	4.1	0.50	2.5	0.25	1.7	0.25	3.0	1	4.5	1	4.5	0.05	2.4	0.5	3.0	0.25	2.7
Cadmium	0.005	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Chloride	200.0	10	140	10	150	10	130	10	110	10	100	10	140	10	120	10	120	10	100	10	130	10	140
Chromium	0.1	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND
Cobalt	1.0	0.0010	ND	0.0010	ND	0.0010	0.0012	0.0010	ND	0.0010	ND	0.001	ND	0.001	0.002	0.001	0.002	0.001	ND	0.001	ND	0.001	ND
Copper	0.65	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND
Cyanide	0.2	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND
Fluoride	4.0	0.10	0.52	0.10	0.70	0.10	0.54	0.10	0.46	0.10	0.34	0.1	0.71	0.1	0.52	0.1	0.52	0.1	0.5	0.1	0.63	0.1	0.74
Iron	5.0	0.10	0.38	0.10	0.54	0.10	1.1	0.10	ND	0.10	0.20	0.1	1.1	0.1	1.6	0.1	1.6	0.1	ND	0.1	1.2	0.1	1.2
Lead	0.0075	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Manganese	0.15	0.0025	0.36	0.0025	0.27 B	0.0025	0.62	0.0025	0.096	0.0025	0.24	0.0025	0.32	0.0025	0.63	0.0025	0.63	0.0025	0.15	0.0025	0.3	0.0025	0.23
Mercury	0.002	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND ^	0.00020	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND
Nickel	0.1	0.0020	0.0035	0.0020	0.0045	0.0020	0.010	0.0020	0.0035	0.0020	ND	0.002	0.0037	0.002	0.007	0.002	0.007	0.002	0.0034	0.002	0.0042	0.002	0.0035
Nitrogen/Nitrate	10.0	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	0.11
Nitrogen/Nitrate, Nit	NA	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	0.11
Nitrogen/Nitrite	NA	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND
Perchlorate	0.0049	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND
Selenium	0.05	0.0025	ND	0.0025	ND	0.0025	ND	0.0050	0.012	0.0025	0.0069	0.0025	0.011	0.0025	ND	0.0025	ND	0.0025	0.0051	0.0025	ND	0.0025	0.0025
Silver	0.05	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Sulfate	400.0	100	580	130	520	250	680	100	450	50	210	100	600	250	830	250	830	100	660	250	470	100	510
Thallium	0.002	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND
Total Dissolved Soli	1,200	10	1400	10	1300	10	1700	10	1500	10	920	10	1200	10	2000	10	2000	10	1300	10	1300	10	1200
Vanadium	0.049	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND
Zinc	5.0	0.020	ND	0.020	ND	0.020	ND	0.020	ND ^	0.020	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND
Benzene	0.005	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
BETX	11.705	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	0.00095	0.0025	0.00091	0.0025	ND	0.0025	ND	0.0025	0.00502
pH	6.5 - 9.0	NA	6.85	NA	7.13	NA	7.06	NA	7.02	NA	7.15	NA	7.08	NA	6.83	NA	7.05	NA	7.04	NA	6.39	NA	7.31
Temperature	NA	NA	16.06	NA	21.11	NA	15.60	NA	8.97	NA	11.75	NA	16.40	NA	12.12	NA	110.84	NA	16.09	NA	19.51	NA	17.44
Conductivity	NA	NA	1.61	NA	1.63	NA	1.95	NA	1.37	NA	1.08	NA	1.40	NA	1.84	NA	1.03	NA	1.324	NA	1.434	NA	1.496
Dissolved Oxygen	NA	NA	1.61	NA	1.25	NA	0.79	NA	2.71	NA	3.97	NA	0.39	NA	2.13	NA	4.01	NA	1.97	NA	2.66	NA	2.40
ORP	NA	NA	-43.1	NA	-114.0	NA	-63.0	NA	-25.9	NA	-43.2	NA	-52.7	NA	-77.3	NA	-8.3	NA	11.04	NA	-46.30	NA	-36.30

Sample: MW-08	Date	2/19/2019		5/29/2019		8/21/2019		12/6/2019		2/18/2020		5/26/2020		8/6/2020		11/3/2020		3/1/2021		5/25/2021		8/25/2021		11/19/2021	
Parameter	Standards	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result
Antimony	0.006	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	ND	ND	0.003	ND
Arsenic	0.010	0.001	0.0018	0.001	0.0032	0.001	0.0083	0.001	0.0069	0.001	0.006	0.001	0.003	0.001	0.011	0.001	0.002	0.001	ND	0.001	0.0057	0.0088	0.0088	0.001	0.0066 F1
Barium	2.0	0.0025	0.077	0.0025	0.069	0.0025	0.064	0.0025	0.082	0.0025	0.075	0.0025	0.086	0.0025	0.081	0.0025	0.067	0.0025	0.063	0.0025	0.089	0.069	0.069	0.0025	0.064 F1
Beryllium	0.004	0.001	ND	0.001	ND	0.001	ND ^	0.001	ND	0.001	ND ^	0.001	ND	0.001	ND	0.001	ND ^	0.001	ND	0.001	ND	ND	ND	0.001	ND
Boron	2.0	0.25	1.5	0.25	1.0	0.25	2.5	0.25	2.6	0.25	2.4	0.25	1.1	0.25	2.8	0.5	3.0	0.25	1.6	0.5	2.5	3.1	3.1	0.5	3.8
Cadmium	0.005	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	ND	ND	0.0005	ND
Chloride	200.0	10	64	10	27	10	130	10	50	10	150	10	200	10	180	10	210	10	180	40	300	150	150	20	340
Chromium	0.1	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	ND	ND	0.005	ND
Cobalt	1.0	0.001	0.001	0.001	ND	0.001	ND	0.001	0.0012	0.001	0.0011	0.001	0.0011	0.001	ND	0.001	0.0012	0.001	ND	0.001	0.0012	ND	ND	0.001	0.0017
Copper	0.65	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	ND	ND	0.002	ND
Cyanide	0.2	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.005	0.0058	0.005	0.087 H	ND	ND	0.005	ND
Fluoride	4.0	0.1	0.47	0.1	0.48	0.1	0.67	0.1	0.58	0.1	0.54	0.1	0.48	0.1	0.63	0.1	0.61	0.1	0.46	0.1	0.49	0.58	0.58	0.1	0.47
Iron	5.0	0.1	0.52	0.1	1.3	0.1	1.4 F1	0.1	2.1	0.1	1.9	0.1	2.0	0.1	2.0	0.1	0.51	0.1	0.22	0.1	2.3	1.3	1.3	0.1	1.2 F1
Lead	0.0075	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	ND	ND	0.0005	ND
Manganese	0.15	0.0025	0.3	0.0025	0.28	0.0025	0.23	0.0025	0.45	0.0025	0.44	0.0025	0.45	0.0025	0.36	0.0025	0.38	0.0025	0.21	0.0025	0.52	0.27	0.27	0.0025	0.63 F1
Mercury	0.002	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	0.0022 F1	0.0002	ND	0.0002	ND	0.0002	ND	ND	ND	0.0002	ND
Nickel	0.1	0.002	0.0024	0.002	ND	0.002	0.0032	0.002	0.0038	0.002	0.0036	0.002	ND	0.002	0.0037	0.002	0.0057	0.002	0.0021	0.002	0.004	0.0043	0.0043	0.002	0.0053
Nitrogen/Nitrate	10.0	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	ND	ND	0.1	ND
Nitrogen/Nitrate, Nit	NA	0.1	ND	0.1	ND ^	0.1	ND	0.1	ND	0.1	ND F2	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	ND	ND	0.1	ND
Nitrogen/Nitrite	NA	0.02	ND	0.02	0.02	0.02	ND	0.02	ND H3	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	ND	ND	0.02	ND
Perchlorate	0.0049	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	ND	ND	0.004	ND
Selenium	0.05	0.0025	0.011	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	0.0044	0.0025	ND	0.0025	ND	0.0025	0.0034	0.0025	0.032	0.0025	ND	0.0025	0.0025	0.0025	0.0045 F1
Silver	0.05	0.0005	ND	0.0005	ND	0.0005	ND ^	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	ND	ND	0.0005	ND
Sulfate	400.0	100	290	100	80	100	530	100	500	100	ND	100	150	100	560	100	620	100	250	100	540	500	500	100	620
Thallium	0.002	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	ND	ND	0.002	ND F1
Total Dissolved Soli	1,200	10	1100	10	630	10	1100	10	1200	10	1100	10	1000	60	1300	150	1800	10	1200	10	1600	1200	1200	10	2000
Vanadium	0.049	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	ND	ND	0.005	ND
Zinc	5.0	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	ND	ND	0.02	ND
Benzene	0.005	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
BETX	11.705	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND
pH	6.5 - 9.0	NA	6.9	NA	6.99	NA	7.23	NA	6.98	NA	7.08	NA	6.86	NA	6.92	NA	6.83	NA	7.03	NA	6.9	NA	7.45	NA	6.66
Temperature	NA	NA	9.60	NA	11.70	NA	15.30	NA	13.10	NA	10.20	NA	11.70	NA	15.00	NA	16.00	NA	9.10	NA	12.10	NA	16.30	NA	15.20
Conductivity	NA	NA	1.558	NA	0.980	NA	0.165	NA	1.806	NA	1.717	NA	1.509	NA	1.826	NA	2.530	NA	1.682	NA	2.430	NA	2.941	NA	2.933
Dissolved Oxygen	NA	NA	0.89	NA	0.37	NA	0.23	NA	0.93	NA	0.70	NA	0.66	NA	NM	NA	1.90	NA	2.30	NA	0.19	NA	0.17	NA	0.36
ORP	NA	NA	-22.20	NA	-58.90	NA	-97.60	NA	-69.20	NA	-67.90	NA	-57.80	NA	-85.30	NA	-60.10	NA	-23.50	NA	73.90	NA	-136.00	NA	180.80

Notes: Standards obtained from IAC, Title 35, Chapter I, Part 620, Subpart D, Section 620.410 - Groundwater Quality Standards for Class I: Potable Resource Groundwater.
All values are in mg/L (ppm) unless otherwise noted.
DL - Detection limit
NA - Not Applicable
ND - Not Detected
NM - Not Measured
NR - Not Required
NS - Not Sampled
Temperature °C degrees Celcius
Conductivity ms/cm^c millisiemens/centimeters
Dissolved Oxygen mg/L milligrams/liter
Oxygen Reduction Potential (ORP) mV millivolts
^ - Denotes instrument related QC exceeds the control limits
F1 - MS and/or MSD Recovery outside of limits
F2 - MS/MSD RPD exceeds control limits
H - Prepped/analyzed beyond the holding time

Sample: MW-09	Date	12/13/2010		3/28/2011		6/15/2011		9/15/2011		12/8/2011		3/16/2012		6/20/2012		9/24/2012		12/18/2012		3/5/2013		5/23/2013	
Parameter	Standards	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result
Antimony	0.006	0.0030	ND^	0.0030	ND	0.015	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND
Arsenic	0.010	0.0010	0.0059	0.0010	0.0049	0.0050	0.0052	0.0010	0.0065	0.0010	0.0078	0.0010	0.0053	0.0010	0.0056	0.0010	0.0068	0.0010	0.0060	0.0010	0.0051	0.0010	0.0047
Barium	2.0	0.0025	0.025	0.0025	0.031	0.013	0.025	0.0025	0.023	0.0025	0.017	0.0025	0.023	0.0025	0.022	0.0025	0.026	0.0025	0.020	0.0025	0.016	0.0025	0.025
Beryllium	0.004	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND
Boron	2.0	0.25	2.2	0.25	1.4	0.050	1.7	0.050	2.0	0.050	1.9	0.25	1.4	1.0	1.8	0.25	2.0	0.50	1.7	0.50	1.5	0.50	1.7
Cadmium	0.005	0.00050	ND	0.00050	ND	0.0025	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Chloride	200.0	10	100	10	280	10	230	10	190	10	140	10	200	10	160	10	160	10	130	10	140	10	160
Chromium	0.1	0.0050	ND	0.0050	ND	0.025	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND
Cobalt	1.0	0.0010	ND	0.0010	ND	0.0050	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND
Copper	0.65	0.0020	ND	0.0020	ND	0.010	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Cyanide	0.2	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	0.018	0.010	ND	0.010	ND	0.010	ND	0.010	ND
Fluoride	4.0	0.10	0.33	0.10	0.36	0.10	0.28	0.10	0.28	0.10	0.38	0.10	0.39	0.10	0.32	0.10	0.41	0.10	0.42 ^	0.10	0.43 ^	0.10	0.32
Iron	5.0	0.10	ND	0.10	ND	0.50	ND	0.10	ND	0.10	ND^	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND
Lead	0.0075	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Manganese	0.15	0.0025	ND	0.0025	ND	0.013	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	0.0036	0.0025	ND	0.0025	ND	0.0025	ND
Mercury	0.002	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND
Nickel	0.1	0.0020	ND	0.0020	ND	0.010	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	0.0022	0.0020	0.0023	0.0020	0.0022	0.0020	ND
Nitrogen/Nitrate	10.0	0.10	ND	0.20	2.4	0.10	1.1	0.10	ND	0.10	1.9	0.10	3.2	0.10	ND	0.10	ND	0.10	4.1	0.10	6.2	0.10	0.40
Nitrogen/Nitrate, Nit	NA	0.10	ND	0.10	3.6	0.10	0.94	0.10	0.18	0.10	2.0	0.50	3.3	0.10	ND	0.10	ND^	0.10	4.6	1.0	6.8	0.10	1.4
Nitrogen/Nitrite	NA	0.10	0.44	0.20	1.2	0.020	0.16	0.040	0.22	0.020	0.15	0.020	0.12	0.020	0.027	0.020	0.023	0.10	0.55	0.10	0.65	0.20	1.0
Perchlorate	0.0049	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.004	ND	0.004	ND ^	0.0040	ND
Selenium	0.05	0.0025	0.0036	0.0025	0.0042	0.013	ND	0.0025	0.0045	0.0025	0.0031	0.0025	ND	0.0025	0.0026	0.0025	0.0031	0.0025	0.0039	0.0025	0.0029	0.0025	0.0027
Silver	0.05	0.00050	ND	0.00050	ND	0.0025	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Sulfate	400.0	100	410	100	320	100	410	50	400	50	270	50	340	100	340	100	380	50	310	50	250	50	320
Thallium	0.002	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Total Dissolved Soli	1,200	10	800	10	1000	10	940	10	850	10	660	10	820	10	880	10	800	10	780	10	600	10	690
Vanadium	0.049	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.0050	0.031	0.0050	0.024	0.0050	0.029
Zinc	5.0	0.020	ND	0.020	ND	0.10	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND
Benzene	0.005	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.0005	ND	0.0005	ND	0.00050	ND
BETX	11.705	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.0025	ND	0.0025	ND	0.0025	ND
pH	6.5 - 9.0	NA	10.88	NA	10.87	NA	10.44	NA	10.27	NA	9.55	NA	10.56	NA	10.31	NA	10.23	NA	10.42	NA	10.39	NA	9.93
Temperature	NA	NA	15.09	NA	11.33	NA	14.55	NA	16.79	NA	15.70	NA	13.35	NA	15.35	NA	18.14	NA	14.68	NA	11.10	NA	13.62
Conductivity	NA	NA	1.33	NA	1.75	NA	1.52	NA	1.12	NA	0.90	NA	1.00	NA	1.06	NA	1.09	NA	0.90	NA	0.76	NA	0.83
Dissolved Oxygen	NA	NA	NM	NA	0.27	NA	0.07	NA	0.03	NA	0.05	NA	0.30	NA	0.03	NA	0.06	NA	0.11	NA	0.52	NA	0.25
ORP	NA	NA	NM	NA	-289.3	NA	79.8	NA	-341	NA	-118	NA	-12	NA	-70	NA	-112	NA	-200	NA	-36	NA	-107.1

Sample: MW-09	Date	8/15/2013		10/29/2013		2/13/2014		5/20/2014		8/12/2014		10/21/2014		2/3/2015		4/30/2015		7/27/2015		11/11/2015		2/16/2016	
Parameter	Standards	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result
Antimony	0.006	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND
Arsenic	0.010	0.0010	0.0050	0.0010	0.0066	0.0010	0.0029	0.0010	0.0029	0.0010	0.0043	0.0010	0.0046	0.0010	0.0038	0.0010	0.0044	0.0010	0.0032	0.0010	0.0057	0.0010	0.0041
Barium	2.0	0.0025	0.026	0.0025	0.023	0.0025	0.022	0.0025	0.028	0.0025	0.027	0.0025	0.026	0.0025	0.033	0.0025	0.032	0.0025	0.026	0.0025	0.030	0.0025	0.019
Beryllium	0.004	0.0010	ND	0.0010	ND	0.0010	ND^	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND
Boron	2.0	0.50	1.8	0.10	2.2	0.50	1.4	0.50	1.5	0.25	1.7	0.50	1.9	1.0	1.4	0.25	1.5	0.25	2.0	0.50	2.1	0.050	1.9
Cadmium	0.005	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Chloride	200.0	10	170	10	110	10	270	10	250	10	210	10	200	10	200	10	310	10	230	10	190	10	160
Chromium	0.1	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND
Cobalt	1.0	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND
Copper	0.65	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Cyanide	0.2	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND
Fluoride	4.0	0.10	0.47	0.10	0.48	0.10	0.44	0.10	0.41	0.10	0.61	0.10	0.55	0.10	0.44	0.10	0.47	0.10	0.51	0.10	0.57	0.10	0.53
Iron	5.0	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND
Lead	0.0075	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Manganese	0.15	0.0025	0.0043	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	0.0025	0.0025	0.0026	0.0025	ND	0.0025	0.0044	0.0025	0.0032	0.0025	0.0025
Mercury	0.002	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND
Nickel	0.1	0.0020	0.0024	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	0.0025	0.0020	0.0024	0.0020	0.0020	0.0020	ND	0.0020	0.0020	0.0020	0.0023	0.0020	0.0024
Nitrogen/Nitrate	10.0	0.10	ND	0.10	1.6	0.10	2.3	0.10	1.0	0.10	ND	0.10	ND	0.10	2.2	0.10	2.7	0.10	0.32	0.10	ND	0.10	0.37
Nitrogen/Nitrate, Nit	NA	0.10	0.44	0.50	2.2	0.50	2.9	0.10	1.5	0.10	0.20	0.10	ND	0.20	2.4	0.20	2.9	0.10	0.43	0.10	ND	0.10	0.39
Nitrogen/Nitrite	NA	0.10	0.49	0.10	0.65	0.10	0.59	0.10	0.48	0.10	0.43	0.020	0.078	0.040	0.21	0.040	0.25	0.020	0.11	0.020	ND	0.020	0.022
Perchlorate	0.0049	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND
Selenium	0.05	0.0025	0.0034	0.0025	0.0053	0.0025	0.0032	0.0025	0.0026	0.0025	0.0031	0.0025	0.0035	0.0025	ND	0.0025	0.0025	0.0025	ND	0.0025	ND	0.0025	ND
Silver	0.05	0.00050	ND ^	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Sulfate	400.0	50	310	50	310	50	220	100	380	100	310	100	430	50	300	50	270	50	290	100	400	50	240
Thallium	0.002	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Total Dissolved Soli	1,200	10	700	10	680	10	780	10	880	10	870	10	820	10	810	10	930	10	760	10	760	10	660
Vanadium	0.049	0.0050	0.023	0.0050	0.034	0.0050	0.017	0.0050	0.017	0.0050	0.015	0.0050	0.015	0.0050	0.011	0.0050	0.010	0.0050	0.0063	0.0050	0.0080	0.0050	0.011
Zinc	5.0	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND
Benzene	0.005	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.0005	0.00057	0.0005	ND
BETX	11.705	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	0.00287	0.0025	ND
pH	6.5 - 9.0	NA	9.86	NA	10.01	NA	9.69	NA	9.71	NA	9.26	NA	8.73	NA	9.48	NA	9.49	NA	9.50	NA	9.12	NA	9.10
Temperature	NA	NA	16.90	NA	16.28	NA	11.58	NA	16.41	NA	16.36	NA	15.98	NA	5.11	NA	13.72	NA	20.11	NA	13.45	NA	9.62
Conductivity	NA	NA	0.93	NA	0.85	NA	0.85	NA	1.25	NA	1.12	NA	1.19	NA	0.83	NA	1.224	NA	1.197	NA	0.996	NA	0.65
Dissolved Oxygen	NA	NA	0.48	NA	0.56	NA	0.94	NA	0.43	NA	0.52	NA	0.48	NA	4.87	NA	1.93	NA	0.62	NA	0.76	NA	1.99
ORP	NA	NA	-91.6	NA	-182.7	NA	195.4	NA	-22.8	NA	27.4	NA	-10.8	NA	-42.0	NA	-53.3	NA	-153.7	NA	39.7	NA	-66.2

Sample: MW-09	Date	5/24/2016		8/9/2016		10/25/2016		1/31/2017		5/9/2017		9/6/2017		11/14/2017		2/27/2018		5/1/2018		7/25/2018		10/2/2018	
Parameter	Standards	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result
Antimony	0.006	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND ^	0.0030	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND
Arsenic	0.010	0.0010	0.0039	0.0010	0.0049	0.0010	0.0078	0.0020	0.0050	0.0010	0.0038	0.001	0.0048	0.001	0.0049	0.001	0.0049	0.001	0.0041	0.001	0.0047	0.001	0.006
Barium	2.0	0.0025	0.024	0.0025	0.030	0.0025	0.023	0.0025	0.025	0.0025	0.038	0.0025	0.036	0.0025	0.034	0.0025	0.034	0.0025	0.031	0.0025	0.035	0.0025	0.033
Beryllium	0.004	0.0010	ND	0.0010	ND	0.0010	ND^	0.0010	ND	0.0010	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND
Boron	2.0	0.050	1.4	0.25	1.8	0.50	2.6	0.25	1.7	0.25	1.6	0.25	1.9	0.25	1.9	0.25	1.9	0.05	1.7	0.5	2.2	0.5	2.3
Cadmium	0.005	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Chloride	200.0	10	170	10	150	10	130	10	250	10	360	10	320	10	270	10	270	10	200	10	200	10	190F1
Chromium	0.1	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND
Cobalt	1.0	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND
Copper	0.65	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND
Cyanide	0.2	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND
Fluoride	4.0	0.10	0.45	0.10	0.51	0.10	0.79	0.10	0.56	0.10	0.43	0.1	0.52	0.1	0.5	0.1	0.5	0.1	0.52	0.1	0.5	0.1	0.54
Iron	5.0	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND
Lead	0.0075	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Manganese	0.15	0.0025	0.0044	0.0025	0.0050	0.0025	0.0035	0.0025	0.0032	0.0025	0.0050	0.0025	0.0076	0.0025	0.0053	0.0025	0.0053	0.0025	0.0051	0.0025	0.0071	0.0025	0.0069
Mercury	0.002	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND ^	0.00020	ND	0.0002	ND F1 F2	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND
Nickel	0.1	0.0020	ND	0.0020	0.0028	0.0020	0.0023	0.0020	ND	0.0020	ND	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.0022	0.002	0.002
Nitrogen/Nitrate	10.0	0.10	0.55	0.10	ND	0.10	0.70	0.10	0.11	0.10	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND
Nitrogen/Nitrate, Nit	NA	0.10	0.59	0.10	ND	0.10	0.70	0.10	0.11	0.10	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND
Nitrogen/Nitrite	NA	0.020	0.040	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND
Perchlorate	0.0049	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND
Selenium	0.05	0.0025	ND	0.0025	0.0026	0.0025	ND	0.0050	ND	0.0025	ND	0.0025	0.0071	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND
Silver	0.05	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Sulfate	400.0	50	240	50	260	50	240	50	170	50	200	50	240	50	280	50	280	100	350	100	290	100	260
Thallium	0.002	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND
Total Dissolved Soli	1,200	10	670	10	750	10	640	10	800	10	960	10	920	10	930	10	930	10	860	10	850	10	810
Vanadium	0.049	0.0050	0.0069	0.0050	0.0091	0.0050	0.028	0.0050	0.014	0.0050	0.0094	0.005	ND	0.005	0.0055	0.005	0.0055	0.005	0.0087	0.005	ND	0.005	ND
Zinc	5.0	0.020	ND	0.020	ND	0.020	ND	0.020	ND ^	0.020	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND
Benzene	0.005	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
BETX	11.705	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	0.0014	0.0025	0.0013	0.0025	ND	0.0025	ND	0.0025	0.0128
pH	6.5 - 9.0	NA	8.79	NA	8.35	NA	9.16	NA	8.59	NA	8.58	NA	8.98	NA	8.1	NA	8.11	NA	7.81	NA	7.05	NA	8.09
Temperature	NA	NA	16.98	NA	21.67	NA	15.36	NA	9.23	NA	13.61	NA	17.10	NA	13.31	NA	12.05	NA	16.36	NA	25.16	NA	17.73
Conductivity	NA	NA	0.97	NA	1.14	NA	0.88	NA	0.88	NA	1.10	NA	1.27	NA	1.12	NA	0.95	NA	1.031	NA	1.203	NA	1.136
Dissolved Oxygen	NA	NA	2.42	NA	1.45	NA	1.74	NA	1.74	NA	3.23	NA	0.14	NA	2.63	NA	0.90	NA	1.39	NA	4.04	NA	1.88
ORP	NA	NA	-83.9	NA	-151.8	NA	-89.2	NA	-90.1	NA	-72.5	NA	-45.8	NA	-122.7	NA	-59.8	NA	-9.6	NA	-97.6	NA	-103.1

Sample: MW-09	Date	2/19/2019		5/29/2019		8/21/2019		12/6/2019		2/18/2020		5/26/2020		8/6/2020		11/3/2020		3/1/2021		5/25/2021		8/25/2021		11/23/2021	
Parameter	Standards	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result
Antimony	0.006	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND
Arsenic	0.010	0.001	0.0033	0.001	0.0034	0.001	0.0039	0.001	0.0055	0.001	0.003	0.001	0.0021	0.001	0.0047	0.001	0.0056	0.001	0.0037	0.001	0.0037	0.001	0.0055	0.001	0.0076
Barium	2.0	0.0025	0.034	0.0025	0.031	0.0025	0.027	0.0025	0.025	0.0025	0.04	0.0025	0.037	0.0025	0.036	0.0025	0.03	0.0025	0.043	0.0025	0.053	0.0025	0.05	0.0025	0.041
Beryllium	0.004	0.001	ND	0.001	ND	0.001	ND ^	0.001	ND	0.001	ND ^	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND
Boron	2.0	0.5	1.1	0.5	1.1	0.5	1.6	0.5	1.9	0.5	1.3	0.5	1.3	0.25	1.8	0.5	2.0	0.25	1.3	0.25	1.4	0.25	1.7	0.25	1.8
Cadmium	0.005	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Chloride	200.0	10	350	10	270	10	230	10	150	10	340	10	310	10	280	10	250	40	310	40	380	40	340	20	280
Chromium	0.1	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND
Cobalt	1.0	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND
Copper	0.65	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND
Cyanide	0.2	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.005	0.0064	0.005	ND	0.005	ND	0.005	ND
Fluoride	4.0	0.1	0.26	0.1	0.29	0.1	0.36	0.1	0.46	0.1	0.34	0.1	0.32	0.1	0.45	0.1	0.52	0.1	0.37	0.1	0.36	0.1	0.41	0.1	0.47
Iron	5.0	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND
Lead	0.0075	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Manganese	0.15	0.0025	0.0044	0.0025	0.0059	0.0025	0.0066	0.0025	0.0074	0.0025	0.011	0.0025	0.011	0.0025	0.011	0.0025	0.0097	0.0025	0.014	0.0025	0.017	0.0025	0.016	0.0025	0.012
Mercury	0.002	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND
Nickel	0.1	0.002	0.0024	0.002	0.0025	0.002	0.0029	0.002	0.0023	0.002	ND	0.002	0.0021	0.002	0.0026	0.002	0.0026	0.002	0.0022	0.002	0.0027	0.002	0.0037	0.002	0.0034
Nitrogen/Nitrate	10.0	0.1	2.8	0.1	0.96	0.1	ND	0.1	ND	0.1	0.32	0.1	ND	0.1	ND	0.1	ND	0.1	0.18	0.1	ND	0.1	ND	0.1	ND
Nitrogen/Nitrate, Nit	NA	0.1	2.9	0.1	1.1	0.1	ND	0.1	ND	0.1	0.4	0.1	ND	0.1	ND	0.1	ND	0.1	0.23	0.1	ND	0.1	ND	0.1	ND
Nitrogen/Nitrite	NA	0.02	0.063	0.02	0.14	0.02	ND	0.02	ND H3	0.02	0.076	0.02	ND	0.02	ND	0.02	ND	0.02	0.054	0.02	ND	0.02	ND	0.02	ND
Perchlorate	0.0049	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND
Selenium	0.05	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND ^	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND
Silver	0.05	0.0005	ND	0.0005	ND	0.0005	ND ^	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	0.0005	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Sulfate	400.0	100	150	100	160	100	200	100	190	100	150	100	140	25	190	25	180	25	170	25	190	25	200	25	210
Thallium	0.002	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	0.002	0.002	ND	0.002	ND	0.002	ND	0.002	ND
Total Dissolved Soli	1,200	10	870	10	830	10	710	10	620	10	810	10	800	30	760	30	760	10	860	10	930	10	760	10	1000
Vanadium	0.049	0.005	0.0054	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	0.005	0.005	ND	0.005	ND	0.005	ND	0.005	ND
Zinc	5.0	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	0.02	0.02	ND	0.02	ND	0.02	ND	0.02	ND
Benzene	0.005	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
BETX	11.705	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND
pH	6.5 - 9.0	NA	8.29	NA	8.9	NA	8.87	NA	8.65	NA	8.44	NA	8.66	NA	8.03	NA	8.64	NA	8.02	NA	8.74	NA	9.06	NA	8.73
Temperature	NA	NA	11.4	NA	11.9	NA	15.5	NA	14.8	NA	11.6	NA	12.4	NA	15.3	NA	17.1	NA	11.2	NA	12.8	NA	17.2	NA	16.2
Conductivity	NA	NA	1.541	NA	1.34	NA	9.14	NA	1.161	NA	1.519	NA	1.377	NA	1.346	NA	1.433	NA	1.481	NA	1.678	NA	1.921	NA	1.562
Dissolved Oxygen	NA	NA	2.52	NA	0.31	NA	NM	NA	0.72	NA	0.81	NA	0.62	NA	NM	NA	1.6	NA	0.06	NA	0.18	NA	0.16	NA	0.21
ORP	NA	NA	-37.9	NA	129.4	NA	-189.2	NA	-64.6	NA	-5.1	NA	-48.6	NA	-89.4	NA	-134.8	NA	-61.3	NA	76.7	NA	-178.4	NA	38.1

Notes: Standards obtained from IAC, Title 35, Chapter I, Part 620, Subpart D, Section 620.410 - Groundwater Quality Standards for Class I: Potable Resource Groundwater.
All values are in mg/L (ppm) unless otherwise noted.
DL - Detection limit
NA - Not Applicable
ND - Not Detected
NM - Not Measured
NR - Not Required
NS - Not Sampled
Temperature °C degrees Celcius
Conductivity ms/cm^c millisiemens/centimeters
Dissolved Oxygen mg/L milligrams/liter
Oxygen Reduction Potential (ORP) mV millivolts
^ - Denotes instrument related QC exceeds the control limits
F1 - MS and/or MSD Recovery outside of limits
F2 - MS/MSD RPD exceeds control limits
H - Prepped/analyzed beyond the holding time

Attachment 9-3. Table. CCA Groundwater Analytical Results - Midwest Generation LLC, Will County Station, Romeoville, IL

Sample: MW-10	Date	12/13/2010		3/28/2011		6/15/2011		9/15/2011		12/8/2011		3/16/2012		6/20/2012		9/24/2012		12/18/2012	
Parameter	Standards	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result
Antimony	0.006	0.0030	ND^	0.0030	ND	0.015	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND
Arsenic	0.010	0.0010	0.0041	0.0010	0.0046	0.0050	ND	0.0010	0.0088	0.0010	0.0083	0.0010	0.0056	0.0010	0.0058	0.0010	0.0098	0.0010	0.0085
Barium	2.0	0.0025	0.098	0.0025	0.091	0.013	0.091	0.0025	0.11	0.0025	0.11	0.0025	0.10	0.0025	0.10	0.0025	0.097	0.0025	0.11
Beryllium	0.004	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND
Boron	2.0	0.25	2.1	0.25	1.8	0.050	2.2	0.050	2.8	0.050	2.5	0.25	2.1	0.50	2.1	0.25	3.2	0.50	2.7
Cadmium	0.005	0.00050	ND	0.00050	ND	0.0025	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Chloride	200.0	10	92	10	130	10	150	10	120	10	120	10	100	10	120	10	140	10	140
Chromium	0.1	0.0050	ND	0.0050	ND	0.025	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND
Cobalt	1.0	0.0010	ND	0.0010	ND	0.0050	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND
Copper	0.65	0.0020	ND	0.0020	ND	0.010	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Cyanide	0.2	0.010	ND	0.010	ND	0.010	0.010	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND
Fluoride	4.0	0.10	0.66	0.10	0.64	0.10	0.65	0.10	0.67	0.10	0.59	0.10	0.52	0.10	0.58	0.10	0.72	0.10	0.59 ^
Iron	5.0	0.10	0.32	0.10	0.46	0.50	0.63	0.10	0.60	0.10	0.71	0.10	0.61	0.10	0.58	0.10	0.77	0.10	0.91
Lead	0.0075	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	0.00050
Manganese	0.15	0.0025	0.25	0.0025	0.22	0.013	0.25	0.0025	0.27	0.0025	0.29	0.0025	0.25	0.0025	0.26	0.0025	0.23	0.0025	0.29
Mercury	0.002	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND
Nickel	0.1	0.0020	ND	0.0020	ND	0.010	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	0.0022	0.0020	0.0023
Nitrogen/Nitrate	10.0	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND
Nitrogen/Nitrate, Nit	NA	0.10	ND^	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND^	0.10	ND ^
Nitrogen/Nitrite	NA	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND
Perchlorate	0.0049	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.004	ND
Selenium	0.05	0.0025	ND	0.0025	ND	0.013	ND	0.0025	0.0032	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND
Silver	0.05	0.00050	ND	0.00050	ND	0.0025	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Sulfate	400.0	100	370	100	370	100	350	100	420	100	290	50	330	100	350	100	380	100	270
Thallium	0.002	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Total Dissolved Soli	1,200	10	990	10	960	10	990	10	1000	10	1100	10	990	10	1000	10	970	10	1100
Vanadium	0.049	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.0050	ND
Zinc	5.0	0.020	ND	0.020	ND	0.10	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND
Benzene	0.005	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.0005	ND
BETX	11.705	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.0025	ND
pH	6.5 - 9.0	NA	7.61	NA	8.14	NA	7.53	NA	7.45	NA	7.10	NA	7.59	NA	7.39	NA	7.60	NA	7.47
Temperature	NA	NA	15.01	NA	10.51	NA	13.34	NA	16.84	NA	14.72	NA	11.27	NA	16.14	NA	18.45	NA	14.44
Conductivity	NA	NA	1.53	NA	1.47	NA	1.51	NA	1.32	NA	1.29	NA	1.06	NA	1.26	NA	1.30	NA	1.32
Dissolved Oxygen	NA	NA	NM	NA	0.42	NA	0.08	NA	0.05	NA	0.09	NA	0.02	NA	0.03	NA	0.01	NA	0.36
ORP	NA	NA	NM	NA	-208	NA	-88.7	NA	-241	NA	-177	NA	-119	NA	-124	NA	-126	NA	-120

Sample: MW-10	Date	3/5/2013		5/22/2013		8/15/2013		10/28/2013		2/20/2014		5/20/2014		8/13/2014		10/20/2014		2/3/2015	
Parameter	Standards	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result
Antimony	0.006	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND
Arsenic	0.010	0.0010	0.0072	0.0010	0.0077	0.0010	0.0040	0.0010	0.012	0.0010	0.0027	0.0010	0.0012	0.0010	0.0033	0.0010	0.0090	0.0010	0.012
Barium	2.0	0.0025	0.098	0.0025	0.10	0.0025	0.082	0.0025	0.10	0.0025	0.094	0.0025	0.071	0.0025	0.071	0.0025	0.10	0.0025	0.12
Beryllium	0.004	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND^	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND
Boron	2.0	0.50	2.7	0.50	2.7	0.50	2.3	0.10	3.8	0.25	2.5	0.50	2.2	0.25	2.1	0.50	3.3	1.0	3.3
Cadmium	0.005	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Chloride	200.0	10	130	10	140	10	130	10	140	10	140	10	140	10	140	10	140	10	110
Chromium	0.1	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND
Cobalt	1.0	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND
Copper	0.65	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Cyanide	0.2	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND
Fluoride	4.0	0.10	0.57 ^	0.10	0.66	0.10	0.73	0.10	0.73	0.10	0.64	0.10	0.74	0.10	0.99	0.10	0.75	0.10	0.58
Iron	5.0	0.10	0.93	0.10	1.1	0.10	0.48	0.10	0.79	0.10	0.36	0.10	0.28	0.10	0.45	0.10	1.0	0.10	1.5
Lead	0.0075	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Manganese	0.15	0.0025	0.29	0.0025	0.24	0.0025	0.14	0.0025	0.22	0.0025	0.18	0.0025	0.12	0.0025	0.12	0.0025	0.25	0.0025	0.38
Mercury	0.002	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND
Nickel	0.1	0.0020	0.0027	0.0020	0.0020	0.0020	0.0020	0.0020	0.0030	0.0020	0.0023	0.0020	ND	0.0020	0.0024	0.0020	0.0033	0.0020	0.0027
Nitrogen/Nitrate	10.0	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND
Nitrogen/Nitrate, Nit	NA	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND
Nitrogen/Nitrite	NA	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND
Perchlorate	0.0049	0.004	ND ^	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND
Selenium	0.05	0.0025	0.0059	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND
Silver	0.05	0.00050	ND	0.00050	ND	0.00050	ND ^	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Sulfate	400.0	100	350	50	350	100	300	50	330	50	290	100	270	100	260	100	380	50	260
Thallium	0.002	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Total Dissolved Soli	1,200	10	1000	10	1100	10	900	10	920	10	1000	10	940	10	880	10	1100	10	1100
Vanadium	0.049	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND
Zinc	5.0	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND
Benzene	0.005	0.0005	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
BETX	11.705	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND
pH	6.5 - 9.0	NA	7.54	NA	7.53	NA	7.38	NA	7.27	NA	9.18	NA	7.54	NA	7.54	NA	6.84	NA	7.32
Temperature	NA	NA	10.50	NA	13.44	NA	16.41	NA	16.70	NA	10.54	NA	15.30	NA	16.39	NA	18.21	NA	10.10
Conductivity	NA	NA	1.18	NA	1.21	NA	1.09	NA	1.25	NA	1.03	NA	1.13	NA	1.11	NA	1.46	NA	1.17
Dissolved Oxygen	NA	NA	0.20	NA	0.30	NA	0.15	NA	0.23	NA	1.50	NA	0.46	NA	0.29	NA	2.15	NA	0.79
ORP	NA	NA	-117.4	NA	-97.8	NA	-112.1	NA	-165.8	NA	-187.5	NA	-68.3	NA	-77.9	NA	-159.3	NA	-98.60

Sample: MW-10	Date	4/30/2015		7/27/2015		11/10/2015		2/16/2016		5/25/2016		8/10/2016		10/26/2016		2/2/2017		5/10/2017	
Parameter	Standards	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result
Antimony	0.006	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND ^	0.0030	ND
Arsenic	0.010	0.0010	0.014	0.0010	0.0065	0.0010	0.017	0.0010	0.0075	0.0010	0.0099	0.0010	0.011	0.0010	0.025	0.0020	0.013	0.0010	0.0081
Barium	2.0	0.0025	0.10	0.0025	0.084	0.0025	0.11	0.0025	0.092	0.0025	0.089	0.0025	0.10	0.0025	0.14	0.0025	0.10	0.0025	0.098
Beryllium	0.004	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND^	0.0010	ND	0.0010	ND
Boron	2.0	0.25	3.6	0.25	3.1	0.50	4.4	0.050	3.6	0.050	3.8	0.25	3.7	0.50	3.5	0.25	3.2	0.50	3.0
Cadmium	0.005	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND ^	0.00050	ND
Chloride	200.0	10	130	10	140	10	140	10	130	10	120	10	120	2.0	73	10	86	10	100
Chromium	0.1	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND
Cobalt	1.0	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND
Copper	0.65	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Cyanide	0.2	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND
Fluoride	4.0	0.10	0.67	0.10	0.77	0.10	0.77	0.10	0.75	0.10	0.74	0.10	0.76	0.10	0.52	0.10	0.52	0.10	0.44
Iron	5.0	0.10	1.4	0.10	1.1	0.10	1.3	0.10	1.1	0.10	1.2	0.10	0.92	0.10	2.6	0.10	1.9	0.10	1.5
Lead	0.0075	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Manganese	0.15	0.0025	0.29	0.0025	0.19	0.0025	0.26	0.0025	0.25	0.0025	0.20	0.0025	0.25 B	0.0025	0.43	0.0025	0.32	0.0025	0.21
Mercury	0.002	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	0.00035	0.00020	ND	0.00020	ND	0.00020	ND ^	0.00020	ND
Nickel	0.1	0.0020	0.0036	0.0020	0.0025	0.0020	0.0030	0.0020	0.0049	0.0020	0.0032	0.0020	0.0037	0.0020	0.0023	0.0020	0.0023	0.0020	0.0022
Nitrogen/Nitrate	10.0	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND
Nitrogen/Nitrate, Nit	NA	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND
Nitrogen/Nitrite	NA	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND
Perchlorate	0.0049	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND
Selenium	0.05	0.0025	0.0036	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	0.0029	0.0050	ND	0.0025	ND
Silver	0.05	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND ^	0.00050	ND
Sulfate	400.0	50	260	50	350	50	330	50	270	50	270	50	240	50	240	50	180	50	280
Thallium	0.002	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Total Dissolved Soli	1,200	10	1000	10	970	10	990	10	1000	10	920	10	1000	10	980	10	1000	10	1000
Vanadium	0.049	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND
Zinc	5.0	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND ^	0.020	ND
Benzene	0.005	0.00050	ND	0.00050	ND	0.0005	ND	0.0005	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
BETX	11.705	0.0025	ND	0.0025	ND	0.0025	0.0019	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND
pH	6.5 - 9.0	NA	7.43	NA	7.73	NA	7.34	NA	7.29	NA	7.26	NA	7.22	NA	7.30	NA	7.16	NA	7.83
Temperature	NA	NA	10.95	NA	18.29	NA	15.44	NA	8.85	NA	16.52	NA	21.72	NA	12.27	NA	10.19	NA	15.58
Conductivity	NA	NA	1.93	NA	1.31	NA	1.25	NA	0.87	NA	1.26	NA	1.40	NA	1.17	NA	1.04	NA	1.08
Dissolved Oxygen	NA	NA	1.57	NA	0.85	NA	0.58	NA	0.67	NA	0.97	NA	1.43	NA	2.21	NA	0.79	NA	1.68
ORP	NA	NA	-115.0	NA	-141.9	NA	-68.9	NA	-60.3	NA	-123.3	NA	-73.2	NA	-87.5	NA	-65.6	NA	-92.4

Sample: MW-10	Date	9/7/2017		11/15/2017		2/27/2018		5/1/2018		7/25/2018		10/3/2018		2/20/2019		5/29/2019		8/21/2019	
Parameter	Standards	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result
Antimony	0.006	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND
Arsenic	0.010	0.001	0.0073	0.001	0.013	0.001	0.013	0.001	0.0077	0.001	0.0072	0.001	0.0058	0.001	0.0029	0.001	0.0059	0.001	0.0076
Barium	2.0	0.0025	0.081	0.0025	0.11	0.0025	0.11	0.0025	0.096	0.0025	0.086	0.0025	0.067	0.0025	0.079	0.0025	0.071	0.0025	0.07
Beryllium	0.004	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND ^
Boron	2.0	0.25	2.6	0.5	4.1	0.5	4.1	0.05	2.9	0.5	3.0	0.5	2.6	0.5	2.5	0.5	1.9	0.5	2.3
Cadmium	0.005	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Chloride	200.0	10	120	10	120	10	120	10	120	10	130	10	150	10	130	10	140	10	150
Chromium	0.1	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND
Cobalt	1.0	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND
Copper	0.65	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND
Cyanide	0.2	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND
Fluoride	4.0	0.1	0.77	0.1	0.76	0.1	0.76	0.1	0.64	0.1	0.76	0.1	0.91	0.1	0.76	0.1	0.81	0.1	0.9
Iron	5.0	0.1	0.91	0.1	1.7	0.1	1.7	0.1	1.6	0.1	1.3	0.1	0.85	0.1	0.43	0.1	0.93	0.1	1.2
Lead	0.0075	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Manganese	0.15	0.0025	0.15	0.0025	0.24	0.0025	0.24	0.0025	0.21	0.0025	0.15	0.0025	0.12	0.0025	0.14	0.0025	0.13	0.0025	0.13
Mercury	0.002	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND F2	0.0002	ND
Nickel	0.1	0.002	0.0024	0.002	0.0029	0.002	0.0029	0.002	0.0027	0.002	0.0029	0.002	ND	0.002	0.0028	0.002	0.0025	0.002	0.0026
Nitrogen/Nitrate	10.0	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND
Nitrogen/Nitrate, Nit	NA	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	0.10 ^	0.1	ND
Nitrogen/Nitrite	NA	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND
Perchlorate	0.0049	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND
Selenium	0.05	0.0025	0.0051 F1	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND
Silver	0.05	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND ^
Sulfate	400.0	100	300	50	260	50	260	50	300	100	240	100	310	100	260	100	250	100	280
Thallium	0.002	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND
Total Dissolved Soli	1,200	10	860	10	1000	10	1000	10	950	10	930	10	850	10	920	10	970	10	800
Vanadium	0.049	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND
Zinc	5.0	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND
Benzene	0.005	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
BETX	11.705	0.0025	ND	0.0025	0.0014	0.0025	0.00063	0.0025	ND	0.0025	ND	0.0025	0.0013	0.0025	ND	0.0025	ND	0.0025	ND
pH	6.5 - 9.0	NA	7.37	NA	7.10	NA	7.03	NA	7.31	NA	7.39	NA	7.60	NA	7.16	NA	7.53	NA	7.58
Temperature	NA	NA	16.70	NA	13.79	NA	10.82	NA	16.60	NA	27.53	NA	20.65	NA	11.40	NA	11.50	NA	15.10
Conductivity	NA	NA	1.11	NA	1.14	NA	0.985	NA	1.156	NA	0.006	NA	1.139	NA	1.386	NA	1.320	NA	0.182
Dissolved Oxygen	NA	NA	0.30	NA	2.19	NA	1.52	NA	1.35	NA	7.21	NA	1.49	NA	0.63	NA	0.22	NA	0.34
ORP	NA	NA	-96.8	NA	-113.2	NA	-56.1	NA	-45.9	NA	-138.2	NA	-105.4	NA	-78.3	NA	-116.4	NA	-130.4

Sample: MW-10	Date	12/5/2019		2/18/2020		5/27/2020		8/6/2020		11/3/2020		2/25/2021		5/25/2021		8/26/2021		11/23/2021	
Parameter	Standards	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result
Antimony	0.006	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND	0.003	ND
Arsenic	0.010	0.001	0.011	0.001	0.016	0.001	0.0056	0.001	0.008	0.001	0.011	0.001	0.0074	0.001	0.011	0.001	0.007	0.001	0.018
Barium	2.0	0.0025	0.089	0.0025	0.11	0.0025	0.076	0.0025	0.084	0.0025	0.088	0.0025	0.13	0.0025	0.14	0.0025	0.082	0.0025	0.14
Beryllium	0.004	0.001	ND	0.001	ND ^	0.001	ND	0.001	ND	0.001	ND ^	0.001	ND ^	0.001	ND	0.001	ND	0.001	ND
Boron	2.0	0.5	3.5	0.5	3.7	0.5	2.4	0.25	3.0	0.5	3.8	0.5	2.9	0.5	3.2	0.5	2.6	0.5	3.6
Cadmium	0.005	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Chloride	200.0	10	120	10	160	10	160	10	140	10	140	10	150	10	150	10	130	10	130
Chromium	0.1	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND
Cobalt	1.0	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND	0.001	ND
Copper	0.65	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND
Cyanide	0.2	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.01	ND	0.005	ND	0.005	0.0058	0.005	ND	0.005	0.0065*+
Fluoride	4.0	0.1	0.92	0.1	0.76	0.1	0.9	0.1	0.91	0.1	0.91	0.1	0.59	0.1	0.7	0.1	0.8	0.1	0.72
Iron	5.0	0.1	1.3	0.1	1.8	0.1	1.2	0.1	1.2	0.1	1.4	0.1	1.5	0.1	1.6	0.1	1.2	0.1	2.6
Lead	0.0075	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	0.00066	0.0005	ND	0.0005	ND	0.0005	ND
Manganese	0.15	0.0025	0.21	0.0025	0.25	0.0025	0.14	0.0025	0.17	0.0025	0.25	0.0025	0.26	0.0025	0.29	0.0025	0.15	0.0025	0.3
Mercury	0.002	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND	0.0002	ND
Nickel	0.1	0.002	0.0029	0.002	0.0023	0.002	0.0025	0.002	0.0027	0.002	0.0026	0.002	0.0023	0.002	0.0054	0.002	0.0034	0.002	0.0041
Nitrogen/Nitrate	10.0	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	0.13	0.1	0.19	0.1	ND	0.1	ND
Nitrogen/Nitrate, Nit	NA	0.1	ND ^	0.1	ND	0.1	ND	0.1	ND	0.1	ND	0.1	0.13	0.1	0.19	0.1	ND	0.1	ND
Nitrogen/Nitrite	NA	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND
Perchlorate	0.0049	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND	0.004	ND
Selenium	0.05	0.0025	ND	0.0025	0.012	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND
Silver	0.05	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
Sulfate	400.0	100	220	100	ND	100	280	100	240	25	170	25	190 F1	25	160	50	260	100	240
Thallium	0.002	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND	0.002	ND
Total Dissolved Soli	1,200	10	890	10	1000	10	870 F1	30	860	30	890	10	950	10	940	10	820	10	1000
Vanadium	0.049	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND	0.005	ND
Zinc	5.0	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND	0.02	ND
Benzene	0.005	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND	0.0005	ND
BETX	11.705	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND
pH	6.5 - 9.0	NA	7.21	NA	7.05	NA	7.29	NA	7.50	NA	7.02	NA	7.20	NA	7.16	NA	7.70	NA	7.07
Temperature	NA	NA	14.30	NA	10.80	NA	11.60	NA	14.90	NA	16.10	NA	10.20	NA	12.90	NA	21.38	NA	12.60
Conductivity	NA	NA	1.503	NA	1.641	NA	1.300	NA	1.348	NA	1.420	NA	1.485	NA	1.601	NA	1.220	NA	1.591
Dissolved Oxygen	NA	NA	0.84	NA	0.17	NA	0.63	NA	NM	NA	0.16	NA	2.12	NA	0.16	NA	0.39	NA	0.59
ORP	NA	NA	-94.6	NA	-106.0	NA	-110.6	NA	-128.7	NA	-149.2	NA	-49.9	NA	-29.7	NA	-158.2	NA	-120.2

Notes: Standards obtained from IAC, Title 35, Chapter I, Part 620, Subpart D, Section 620.410 - Groundwater Quality Standards for Class I: Potable Resource Groundwater.
All values are in mg/L (ppm) unless otherwise noted.

DL - Detection limit
NA - Not Applicable
ND - Not Detected

NM - Not Measured
NR - Not Required
NS - Not Sampled

Temperature	°C	degrees Celcius
Conductivity	ms/cm^{c}	millisiemens/centimeters
Dissolved Oxygen	mg/L	milligrams/liter
Oxygen Reduction Potential (ORP)	mV	millivolts

^ - Denotes instrument related QC exceeds the control limits
F1 - MS and/or MSD Recovery outside of limits
F2 - MS/MSD RPD exceeds control limits
H - Prepped/analyzed beyond the holding time

ATTACHMENT 10
PE CERTIFICATION

Attachment 10 – No Attachment

ATTACHMENT 11
OWNER CERTIFICATION

Attachment 11 – Owner Certification

I, Phillip J Rawsh, as an authorized representative of Midwest Generation, certify that the public notification and public meeting requirements were completed in accordance with 35 Ill. Adm. Code 845.240.

Signature: PJ Rawsh

Title: Plant Manager

Midwest Generation, LLC
Will County Generating Station
Ponds 1 North, 1 South, 2 South, and 3 South Proposed Closure Construction Project
Public Meeting General Summary

INTRODUCTION

In accordance with Title 35 of the Illinois Administrative Code ("35 IAC") Section 845.240, Midwest Generation, LLC (MWG) posted the public meeting notice on the Closure Plans for Will County Generating Station's Ponds 1 North, 1 South, 2 South, and 3 South on its publicly available website and provided a copy of such notice to the Illinois Environmental Protection Agency (Illinois EPA or Agency) to email to its listserv for this facility. The bilingual public meeting notice was mailed to all residents within at least 2 miles of the facility on May 5, 2023, which totaled 7,399 residential mailing addresses. The notice was also posted in 18 public locations within 10 miles of the facility boundary.

The public meetings for Will County Generating Station's Ponds 1 North, 1 South, 2 South, and 3 South were held on June 7, 2023 from 5:30 p.m. to 7:00 p.m. and on June 8, 2023 from 10:00 a.m. to 11:30 a.m. The meetings were held in person. Thirty-eight members of the public attended the meetings on June 7th and 8th (the remaining attendees were MWG affiliate employees and consultants). At least four members of the public attended both meetings. Attendees who wished to sign up for a copy of the meeting summary and/or be added to Illinois EPA's listserv for the facility were asked to sign up via a form provided at the meeting. Thirty-four attendees requested a copy of the meeting summary and thirty-four requested transmittal of their email address to the Agency to be added to the Agency's listserv for the facility. After an introduction and approximately 30-minute presentation on the proposed closure construction plan, the public was given approximately 1 hour during each meeting to ask questions and provide comments. Two letters addressed to MWG and Illinois EPA were presented at the June 7th meeting. These letters are attached to this summary. The letters raise concerns with closure in place methods, transporting ash through nearby communities, and groundwater contamination. Midwest Generation, LLC is fully committed to complying with environmental laws and regulations and will close the ponds in a way that provides both short- and long-term protection to groundwater and surface water resources along with ensuring overall protection to public health, welfare, and safety.

This document serves as a summary of the issues and questions raised during the meeting.

MWG proposes to close Ponds 1 North, 1 South, 2 South, and 3 South in place by installing an alternate final cover system (ClosureTurf®).

SUMMARY OF ISSUES AND QUESTIONS RAISED DURING THE MEETING

Landfill

Several comments and questions were raised about the availability of landfill space in nearby Laraway Landfill and Prairie View Landfill specifically, and other landfills in the area. During development of the Closure Alternatives Analysis, discussions were held with landfill representatives who indicated limited ability to accept new waste streams due to current contractual obligations and reluctance to accept CCR materials due to potential adverse reactions with municipal solid wastes and leachate quality. An onsite landfill was considered and ultimately ruled out because of the lack of available space vertically and horizontally.

Several comments and questions were raised about truck traffic arising from transporting CCR off site, some were concerned about the truck traffic and others were less concerned. High volumes of truck traffic would occur if a closure by removal option is selected. Approximately 10,000 truckloads would be required to complete Option 1 – Closure by Removal; this includes approximately 8,000 truckloads for removal activities and 2,000 truckloads of clean fill to regrade the area for stormwater drainage. The trucking route would depend on the final disposal location but is expected to travel through some portions of residential neighborhoods. Removing the ash by truck would increase the risk of vehicle accidents and would result in increased diesel exhaust emissions. Under the preferred closure scenario only the trucking of the final cap materials and clean fill to regrade the area for stormwater drainage would be needed.

Questions were raised about using rail or barge to transport ash. Transportation by rail and barge are not common methods of managing coal ash and would require the design and construction of new or temporary infrastructure at Will County Station and at the receiving facility. Neither the rail or barge systems at Will County are currently in a usable condition and would need either extensive refurbishment or replacement altogether. The current rail unloading system was designed to transfer coal in one direction, from a railcar to the generating station. It was not designed to transfer CCR (a different material than coal) nor to move material from the station to railcars. To use the rail system at Will County Station for transport of CCR, restoration of the power system, conveyor belt replacement, and new handling equipment would be needed, which could require extensive environmental permitting. Necessary permits may include NPDES, stormwater, and air construction permits. A barge loading system is currently present at Will County Station, but like the rail system it is currently only designed to offload coal, not load CCR material. Like the rail system, a new system could also require extensive environmental permitting, such as NPDES, stormwater, air construction permits, and permits from the Illinois Department of Natural Resources and the Army Corp of Engineers. The bigger issue, however, is that barge and rail unloading facilities are not currently located at landfills, so the material would need to be unloaded at terminal or similar location and then be loaded into trucks for final disposal at the landfill which again raises the truck traffic issue.

Questions were raised regarding beneficial use of the ash within the ponds. The process of evaluating the market for beneficial use of ash is done by MWG's commercial marketing team. MWG routinely evaluates the market for sources that would accept ash for beneficial use and at this time, MWG has not identified any sources.

Groundwater

There was one question about groundwater monitoring results. Ponds 1N and 1S are subject to the Illinois CCR Rule. The most recently completed groundwater monitoring results show that calcium, sulfate, and total dissolved solids are above the proposed groundwater protection standards (GWPS) in monitoring wells downgradient of Pond 1N. Molybdenum is above the proposed GWPS in monitoring wells downgradient of Pond 1S.

Ponds 2S and 3S are subject to both the Illinois and Federal CCR Rules. Under the Illinois CCR Rule, arsenic and chloride have been detected above the proposed GWPS in some downgradient wells in the most recently completed groundwater monitoring results. Under the Federal CCR Rule, selenium and arsenic were detected above the GWPS in the fourth quarter 2022. Selenium was detected above the GWPS in an upgradient well; there have never been and continue to be no detections of selenium in any of the downgradient wells above the GWPS. An Assessment of Corrective Measures was initiated to prevent further releases, remediate any releases, and restore the affected area to original conditions. The Assessment of Corrective Measures was presented during the public meetings and the corrective measure proposed is closure in place with a final cover system.

The proposed GWPS were submitted to Illinois EPA for review and approval as part of the Application for Initial Operating Permit. These standards will remain “proposed” until approved by the Illinois EPA. Per the Illinois CCR Rule, GWPS are the higher of background values measured and calculated from monitoring well sampling or the standards found in 35 Ill. Admin. Code 845.600(a).

Groundwater Modeling

Multiple attendees questioned or commented upon the groundwater modeling. The model allows for a mathematical representation of the groundwater flow system. Actual groundwater level data collected from site monitoring wells over many years is used within the model to replicate the flow conditions within the aquifer that currently exist. Once the computer model can sufficiently replicate actual existing field conditions, a hypothetical, worst-case release was simulated assuming the ponds were filled with ash and sluice water with no liners. The hypothetical case was then used as a baseline for assisting in evaluation of the effectiveness of the various engineering alternatives being considered. The various alternatives were overlaid on the hypothetical release scenario and the model was run through establishment of a new steady state to evaluate the associated improvements in groundwater quality to assess future short- and long-term effects of a proposed engineering option on changes in groundwater quality and flow conditions.

The purpose of groundwater modeling for the proposed construction permit application was to provide feedback to the engineering team to show the effectiveness of each closure scenario. The modeling was done for the overall concepts – complete removal of ash, closure in place with final cover, closure in place with in-situ stabilization, and closure in place with consolidation and final cover. The modeling showed that each of the four scenarios are similarly protective of groundwater and that no constituents would be detected above the proposed site-specific groundwater protection standards in any scenario after approximately ten to fifteen years. This is because under each scenario, the source of the hypothetical release is removed or isolated from the underlying groundwater. In the closure by removal scenario the ash is removed from the impoundments. In the closure in-place scenarios, the liner is in place, the impoundment is dewatered, and an impermeable cap is placed over the CCR precluding any precipitation infiltration though the CCR materials, thereby eliminating any connection of the hypothetical source materials with the underlying groundwater.

The full groundwater modeling report will be included with the construction permit application that will be submitted to Illinois EPA by August 1, 2023. The permit application will be posted to MWG's website within 14 days of submittal to the Illinois EPA.

Closure Method

Several attendees expressed their desire for Option 1 – Closure by Removal due to concerns with potential future groundwater contamination and adverse effects to private drinking water wells. MWG did not identify any private drinking water wells within 2,500 feet of the ponds and no private wells have been impacted by the ponds at Will County. The Des Plaines River and the Chicago Sanitary Ship Canal, which are adjacent to the Will County Station to the west and east respectively, act as hydrogeologic barriers to the groundwater underlying the Station. Under Illinois EPA oversight, MWG will be required to inspect and monitor any CCR surface impoundment that is closed in place for at least 30 years after the closure construction is complete. Post-closure care includes continued groundwater monitoring, impoundment inspections, as-needed repairs to the final cover system, and corrective actions as necessary. While MWG cannot predict future events, the Illinois EPA will continue to have oversight for CCR surface impoundments until the Agency agrees that its oversight is no longer necessary

Financial Assurance

A question was asked about what financial systems are in place to ensure long-term monitoring is completed after closure. Owners and operators of CCR surface impoundments are required to financially assure the costs of closure and post-closure care through the end of the post-closure care period. Financial assurance would be used only in the case of owner insolvency; otherwise, costs for closure, post-closure care, and any necessary remedial activities are paid by the surface impoundment owner and/or operator. Pursuant to the Illinois CCR rule, MWG has provided financial assurance in the form of a performance bond to Illinois EPA.

Closure Costs

Questions were asked about estimated closure costs. While MWG did not use cost as a determinative factor in selecting the closure methods, the estimated costs for each closure method were provided in the Closure Alternatives Analysis (CAA) posted on MWG's website. The estimated cost for Option 1 – Closure by Removal was $26,807,089. The estimated cost for Option 2 – Closure in Place with Final Cover System was $2,974,859. The estimated cost for Option 3 – In-site Stabilization with Final Cover System was $13,320,061. The estimated cost for Option 4 – Closure in Place with Consolidation and Final Cover System was $3,789,953.

Status of Plant and Future Use

Several members of the public commented upon or questioned the status and future use of Will County Station. All electric generating units at Will County Station have been retired, with the most recent being Unit 4 which retired in June of 2022. Decommissioning activities are in progress on the property. MWG has taken initial steps to consider the potential for sustainable redevelopment related to battery storage. The passage of the "Coal-to-Solar" program by the Illinois legislature under the Energy Transition Act in September 2021 is a positive outcome in support of pursuing a meaningful battery storage project at Will County and has the potential to jumpstart the beneficial reuse of this site.

Other Environmental Concerns

A couple of questions were raised about nearby quarrying activities and how that might affect the integrity of the ponds after they are closed in place. The Heidelberg Materials quarry has been operating in that area for decades and MWG has not observed any evidence of adverse effects from their operations. In addition, the Illinois CCR Rule requires annual structural stability assessments and routine (weekly) inspections of operating CCR surface impoundments. After closure, MWG will be required to inspect and monitor any CCR surface impoundment that is closed in place for at least 30 years after the closure construction is complete. Post-closure care includes continued groundwater monitoring, impoundment inspections, as-needed repairs to the final cover system, and corrective actions as necessary.

A question was raised about the status of the Compliance Commitment Agreement (CCA) signed between MWG and the Illinois EPA. The CCA was an agreement between the Illinois EPA and MWG for when the CCR surface impoundments were operating and before there were any regulations applicable to CCR surface impoundments. Now that the Federal CCR Rule and Illinois CCR Rule have passed, MWG is complying with the rules as they apply to the Will County CCR surface impoundments.

One attendee requested information on air quality and groundwater monitoring plans as well as a copy of the watershed map. The fugitive dust plan and groundwater monitoring plan are available in the Operating Permit Application that was submitted to Illinois EPA in October 2021 for Ponds 2S and 3S and March 2022 for Ponds 1N and 1S. The full application, which includes both plans, as well as the Fugitive

Dust Plan independently, are also posted on our public website: www.midwestgenerationllc.com. A copy of the watershed map is attached to this summary.

There was a question raised about PFAS levels in the current high-density polyethylene (HDPE) geomembrane liners in the ponds. According to data provided by the manufacturers of the HDPE liners, the liners do not contain PFAS.

A question was raised about stormwater collection and treatment. Stormwater from the site is collected and treated at our wastewater treatment plant before being discharged to Chicago Sanitary and Ship Canal via our NPDES permit issued by the Illinois EPA. The NPDES permit specifies sampling requirements of the treated stormwater before it's discharged.

An attendee stated that Will County Station and Romeoville are areas of Environmental Justice (EJ) concern. Under the Illinois CCR regulations (see 35 IAC 845.700(g)(6)), the facility must fall within one mile of a census block group identified as low-income or minority as those are defined in the regulations. Will County Station is more than two miles from the nearest EJ area using the Agency's tool and is therefore not in an area of EJ concern. A print-out of Illinois EPA's EJ Start map for Will County Station and Romeoville is attached. Because MWG is aware of the large population of Spanish speakers in Romeoville, Spanish translation was offered at both meetings.

A question was asked about other areas of the property that may have been impacted by former station processes. Station decommissioning activities are ongoing and impacted areas will be addressed as needed.

Correction

Slide 12 of the presentation had an error in the statement of the amount of time the modelling predicted it would take to achieve compliance with the 35 IAC 845.600(a) groundwater standards for the Closure by Removal Scenario. The corrected slide is attached – it will take 50 years to achieve compliance in with the 35 IAC 845.600(a) groundwater standards, the same amount of time it would take in the Closure in Place Scenario. The information is presented correctly in the Closure Alternatives Analysis (see Figure 32).

SUMMARY OF REVISIONS, CHANGES, AND CONSIDERATIONS

Public engagement is an important part of the permitting process. Midwest Generation valued the opportunity to hear and consider the comments of individual community members and others who participated in the public meetings. Taking public comments into consideration, and with additional deliberations after the public meetings, our full analysis indicates that our proposed plan – which remains subject to regulatory review and approval – prioritizes the environment and community well-being.

ATTACHMENTS

June 07, 2023

Midwest Generation, LLC
Attn: Thoedore Craver (CEO)
235 Remington Boulevard, Suite A
Bolingbrook, Illinois

Midwest Generation, LLC
Attn: John Pardo (CPO)
235 Remington Boulevard, Suite A
Bolingbrook, Illinois

Illinois EPA Headquarters
Attn: John J. Kim (Director)
1021 North Grand Avenue East
P.O. Box 19276
Springfield, Illinois 62794

Dear Mr. Craver, Mr. Pardo, and Mr. Kim,

We support the residents of Romeoville and the surrounding areas who are currently petitioning for the clean closure of the Will County Generating Station's coal ash ponds by excavation and complete removal of the ash from the waste ponds. We resoundingly reject the proposal by Midwest Generation to close the coal ash ponds by capping in place. We were elected to represent these residents and stand with them in demanding their community be protected from further contamination to their groundwater and other water sources.

The groundwater near the Will County Generating Station is reported as contaminated from coal ash at a magnitude that exceeds federal health-based guidelines. Soil testing showed that Arsenic and Molybdenum contaminants were twice as high as safe levels recommended by the EPA. Cap-in-place closure does not prevent leaching by groundwater contact with coal ash underneath the cap, and if coal ash is left in contact with groundwater, toxic contaminants will continue to leach into drinking water in perpetuity. Cap-in-place also leaves coal ash surface impoundments permanently vulnerable to catastrophic failure due to floods or cap failure during extreme storms.

Romeoville relies on a deep sandstone aquifer for a portion of its water supply, and a shallow dolomite aquifer for the other portion. Recent studies have revealed that both aquifers are not viable long term sources for the Village's potable water supply. Midwest Generations LLC should not be allowed to potentially put people's water supply at risk as Romeoville will soon need a new source of clean water. It's critical for Romeoville, where water is such a precious resource, to make sure that water is left as clean as possible for future generations.

A clean closure approach includes excavation and removal of coal ash either to a landfill compliant with federal regulations or for beneficial reuse as a raw material in products such as concrete or drywall. Removal of coal ash mitigates both the source of groundwater pollution and the risk of catastrophic spills from impoundment failures due to floods or other extreme weather events. Clean closure removes coal ash from contact with groundwater, thereby protecting drinking water, and moves it away from water bodies, which is a permanent solution to water pollution and which allows restoration of wetlands, rivers, streams, and lakes. Clean closure of coal ash ponds is a more thorough process that employs more people and therefore leads to greater wages and spending in the community.

While the coal power industry has shown a preference for cap-in-place closure of coal ash waste ponds, because it is easier and cheaper to implement, the community chooses effective coal ash pond closures that protect the environment and public health while also creating jobs and benefiting our local economy. We demand Midwest Generation to reconsider their proposal to cap in place, and instead excavate and remove the ash from the ponds to a federally regulated lined landfill away from water sources.

Illinois General Assembly:
Rachel Ventura State – Senator Illinois 43rd District

Will County Board:
Judy Ogalla (County Board Chair, District 2)
Steve Balich (Republican Leader, District 4)
Sherry Williams (Democratic Whip, District 5)
Destinee Ortiz (District 9)
Raquel Mitchell (District 9)
Janet Diaz (District 6)
Mica Freeman (District 8)
Julie Berkowicz (District 10)

Joliet City Council:
Suzanna Ibarra (District 5)
Cesar D. Cardenas (District 4)
Cesar Guerrero (At-Large)
Jan Quillman (At-Large)

Joliet Township:
Angel Contreras (Supervisor)
Alicia Morales (Clerk)
Cesar Escutia (Trustee)
Vince Alessio (Highway Commissioner)

Joliet School Board:
Sandra Aguirre (Dist. 86)

Village of
Romeoville
Where Community Matters

Illinois EPA Headquarters
Attn: John J. Kim (Director)
1021 North Grand Avenue East
P.O. Box 19276
Springfield, Illinois 62794

June 7, 2023

Dear Director Kim,

This letter is regarding the ongoing process of decommissioning NRG's Will County Generating Station, which is primarily located outside of the Village of Romeoville in unincorporated Will County, Illinois. While there are many aspects to this process, this correspondence is focused on the coal ash ponds located on the southern portion of the property outside of the village. The Village of Romeoville appreciates the ongoing dialogue that NRG, our current and former state officials and the Will County Executive's office has engaged in during this process.

The Village of Romeoville strongly feels that the Illinois Environmental Protection Agency (IEPA), which is in the process of enforcing federal coal ash rules, should require the NRG facility at the Will County Generating Station to safely close its existing coal ash ponds 1N, 1S, 2S, and 3S and remediate any surrounding contamination. We believe that NRG's proposal to close each pond through capping and long-term monitoring will create long-term environmental uncertainty, limit the potential for future redevelopment of the property and is not appropriate given its proximity to the Des Plaines River, as well as several environmentally sensitive areas of unincorporated Will County.

Further, the Village of Romeoville requests that the IEPA require NRG to remove the ash entirely and transport it to an appropriate landfill. However, the Village only requests this if the IEPA can determine that doing so does not create a greater environmental danger than the alternative of capping in place. If the IEPA agrees to this request, the Village would additionally ask that all removal be conducted with enhanced considerations to environmental impact during the process. Also, no material should be removed from the site by truck, rail or any other land path that takes it through the Village's jurisdictional boundaries. The Village is concerned about the transportation of any material from these ponds through our community or any surrounding communities and the potential for adverse environmental impact that transportation could have in addition to increased truck traffic.

With respect to the Village's drinking water system, the nearest shallow wells are near the intersection of Normantown Road and Dalhart Ave (1.5 miles northwest) and near Lake Strini (1.8 miles west). These wells are between 200 and 300 feet deep and screened in the

Limestone and Silurian Dolomite. Since the Will County Generation Station opened in 1955, we have no evidence that leaching from the coal ash ponds has impacted any municipal wells and our engineers have limited concerns moving forward as the Village is in the process of moving to a new Lake Michigan water source by 2030. However, the Village cannot speak for nearby municipal wells in other jurisdictions or any private wells.

The IEPA needs to ensure that the final cleanup approach to this site takes the surrounding ecological habitat into consideration as well as the multiple recreational uses that also occur in this area including the Isle a la Cache center, fishing, kayaking, biking, bird watching, and hiking. If the EPA determines that the safest environmental solution is to cap in place, the Village respectfully requests that all current technology be used to safeguard these sensitive areas as well as long term monitoring. Finally, we respectfully request that a special fund be set up to ensure that they are properly maintained.

Thank you for your consideration and ongoing dialogue regarding the decommissioning of this site and the potential redevelopment of the site. If you have any further questions please contact Village Manager, Dawn Caldwell at 815-886-5778 or dcaldwell@romeoville.org.

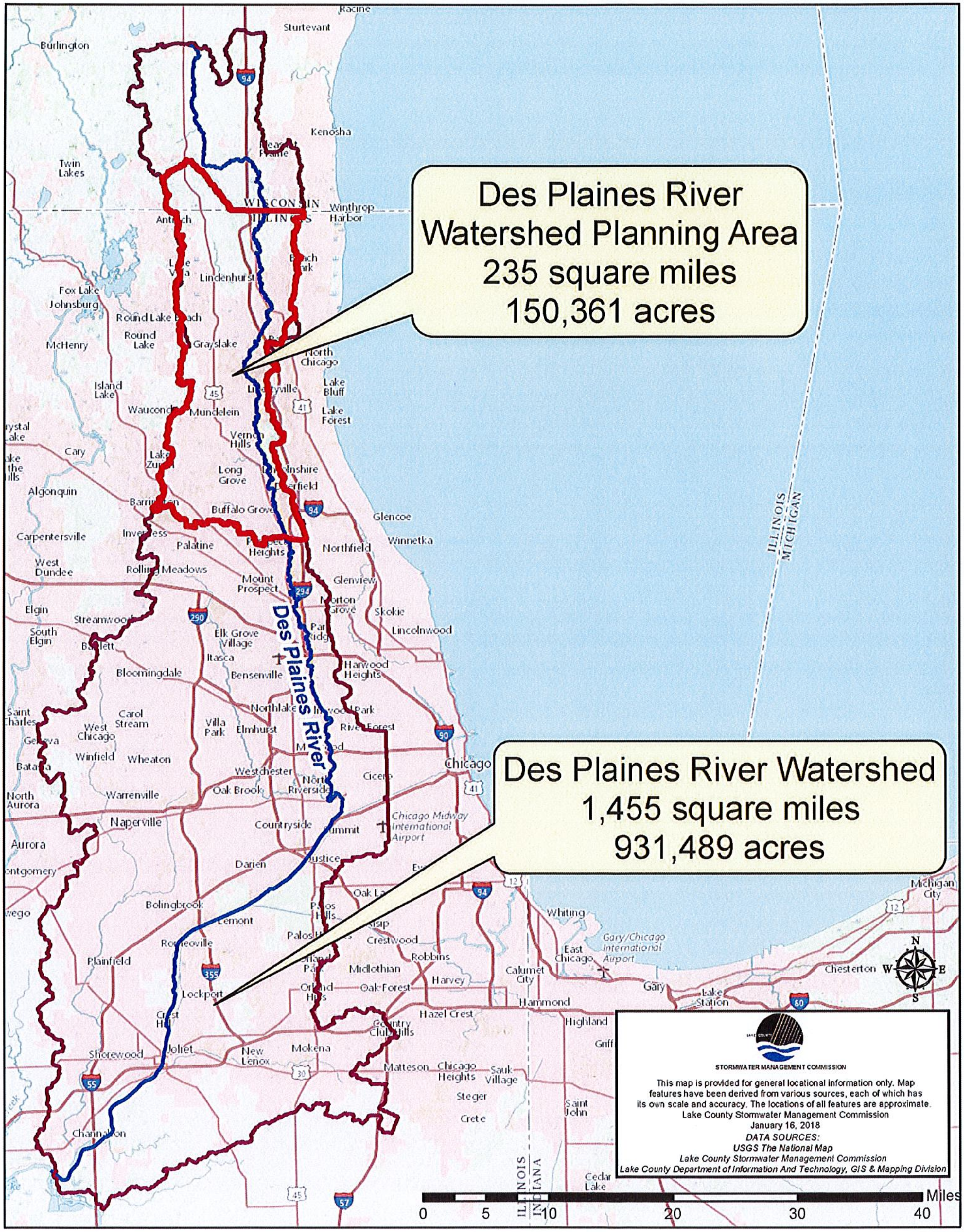
Respectfully,

John D. Noak

John Noak
Mayor

c: Village of Romeoville Board of Trustees
Jennifer Bertino-Tarrant, Will County Executive
Meg Loughran Cappel, Senator 49th District
Dagmara Avelar, State Representative 85th District
Rachel Ventura, State Senator 43rd District
Natalie Manley, State Representative Leader 98th District
Melville Nickerson, NRG Director Government Affairs
Dawn Caldwell, Village Manager

Des Plaines River Watershed Location

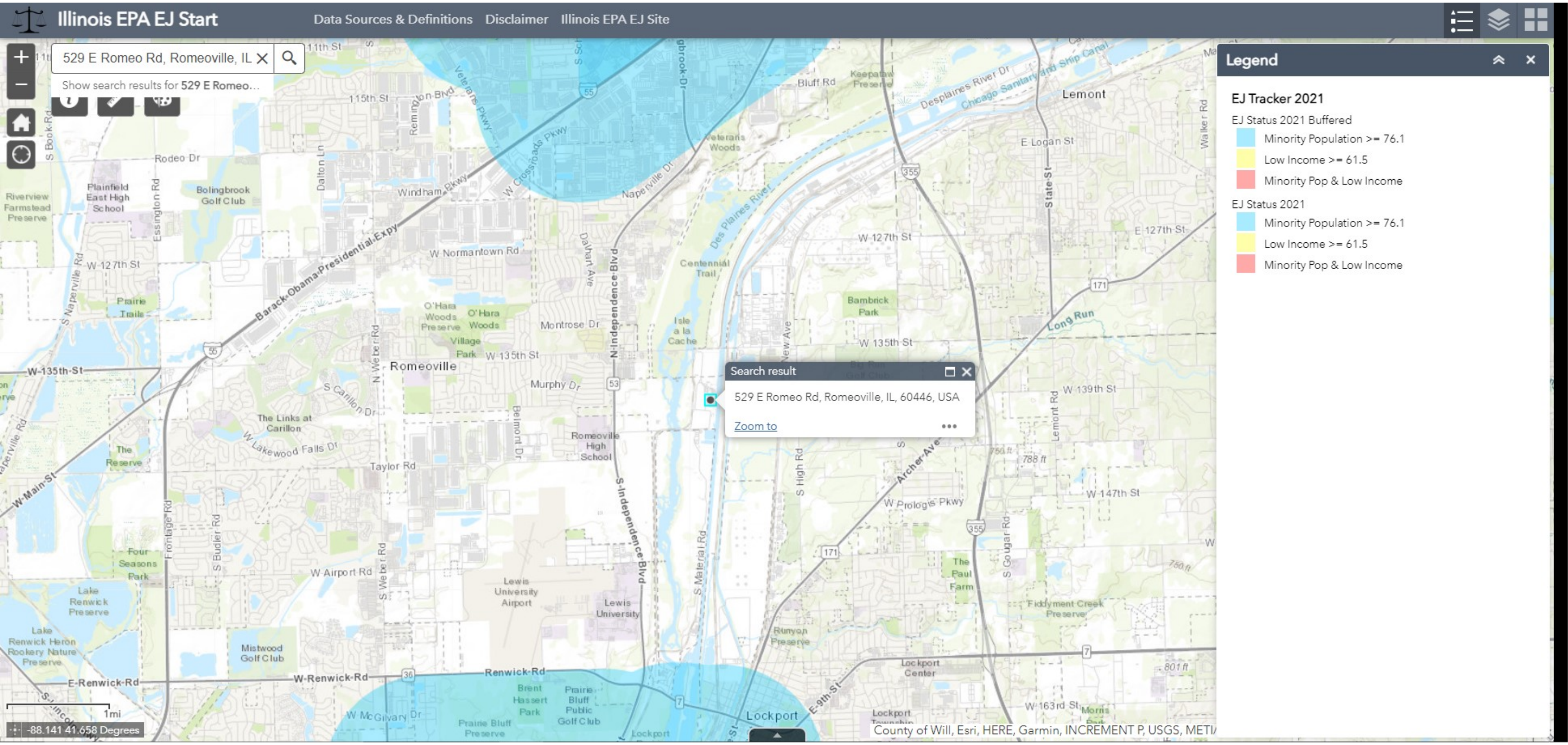


Des Plaines River
Watershed Planning Area
235 square miles
150,361 acres

Des Plaines River Watershed
1,455 square miles
931,489 acres

STORMWATER MANAGEMENT COMMISSION

This map is provided for general locational information only. Map features have been derived from various sources, each of which has its own scale and accuracy. The locations of all features are approximate.
Lake County Stormwater Management Commission
January 16, 2018
DATA SOURCES:
USGS The National Map
Lake County Stormwater Management Commission
Lake County Department of Information And Technology, GIS & Mapping Division



529 E Romeo Rd, Romeoville, IL

Show search results for **529 E Romeo...**

Search result

529 E Romeo Rd, Romeoville, IL, 60446, USA

Legend

EJ Tracker 2021

EJ Status 2021 Buffered

- 🟦 Minority Population >= 76.1
- 🟨 Low Income >= 61.5
- 🟥 Minority Pop & Low Income

EJ Status 2021

- 🟦 Minority Population >= 76.1
- 🟨 Low Income >= 61.5
- 🟥 Minority Pop & Low Income

County of Will, Esri, HERE, Garmin, INCREMENT P, USGS, METI/

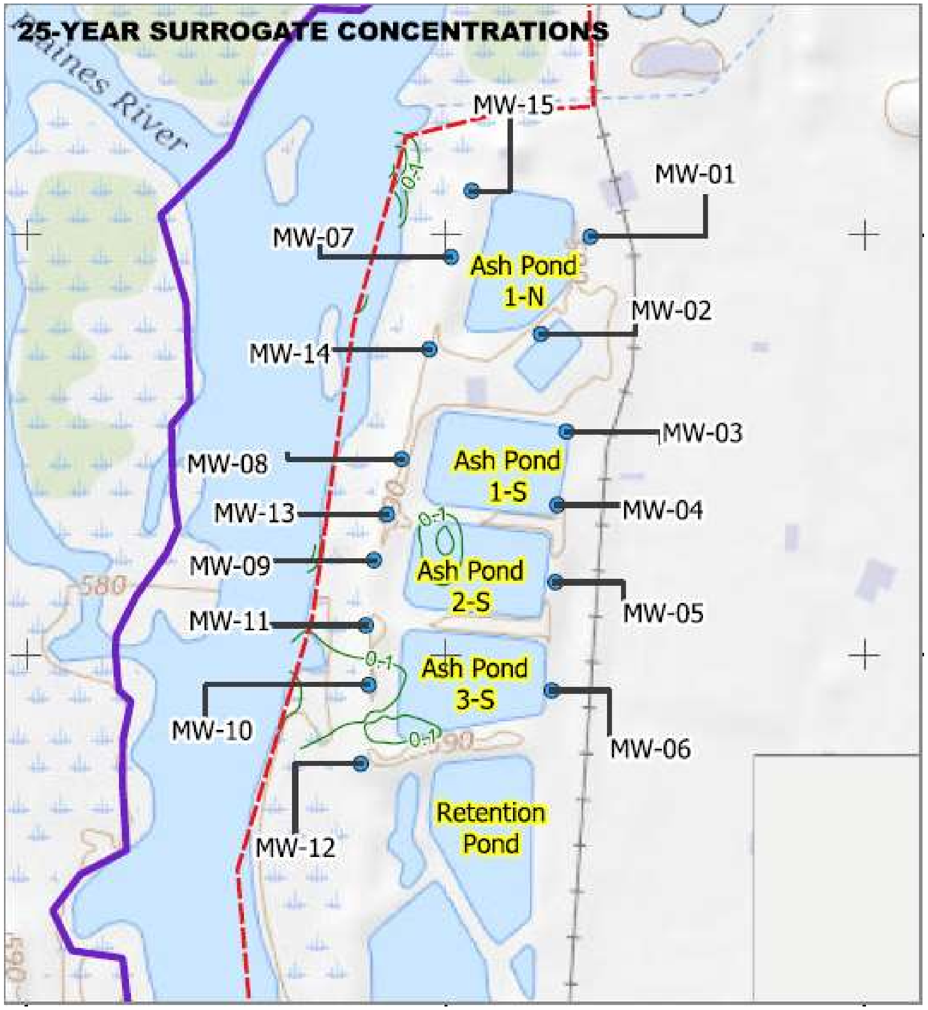
Scenario 1 – Closure by Removal

Closure Alternatives Analysis

Closure by Removal Details

- Remove all material from basin and haul off site.
- Remove existing liner system and haul off site.
- Grade exposed base to manage stormwater.
- Limited local landfill capacity and CCR acceptance is prohibitive.
- Onsite space for a new landfill is limited, and citing would add multiple years to the project.
- Estimated quantities:
  - Area ≈ **9.5 acres**
  - CCR/material to remove ≈ **161,000 CY**
  - Subgrade fill ≈ **40,000 CY**
- **Modeled concentrations are reduced by 80% within 25 years at downgradient wells. All constituents compliant with proposed GWPS with approx. 10 years or less and below the 845.600(a) standards within approx. *~~20~~ 50 yrs.**

GW Modeling (25 years after removal)



*After the June 7th public meeting, MWG identified a typo on this slide. All constituents will be below the 845.600(a) standards within approx. 50 years (See Figure 32, MW-12 of the Closure Alternatives Analysis posted on MWG's website on May 9, 2023).

MWG
Midwest Generation LLC.

Análisis de las alternativas de cierre

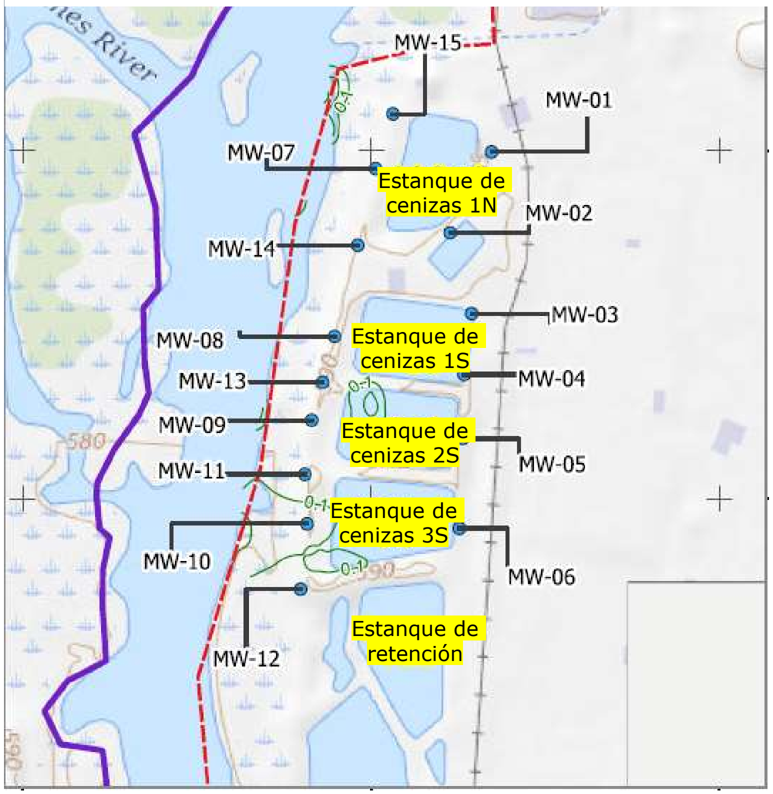
Opción 1: cierre por extracción

Detalles del cierre por extracción

- Extraer todos los materiales de la cuenca y transportarlos fuera del sitio.
- Extraer el sistema de revestimiento existente y transportarlo fuera del sitio.
- Nivelar la base expuesta para manejar el agua de lluvia.
- La capacidad limitada de los rellenos sanitarios locales y la aceptación de CCR la hacen prohibitiva.
- El espacio en el sitio para un nuevo relleno sanitario es limitado, y su designación prolongaría el proyecto durante varios años.
- Cantidades estimadas:
  - Área ≈ **9.5 acres**
  - CCR y material a extraer ≈ **161,000 yd³**
  - Relleno con subrasante ≈ **40,000 yd³**
- **Las concentraciones modeladas se reducen en un 80% en un plazo de 25 años en los pozos situados aguas abajo. Todos los constituyentes en cumplimiento con las normas para la protección de las aguas subterráneas propuestas en unos 10 años o menos, y por debajo de las normas de la Sección 845.600(a) en un plazo de aproximadamente *~~20~~ 50 años**.

Modelado de aguas subterráneas (25 años después de la extracción)

CONCENTRACIONES SUSTITUTAS A 25 AÑOS



* Después de la reunión pública del 7 de junio, MWG identificó un error en esta diapositiva. Todos los ciudadanos quedarán bajo las normas de la Sección 845.600(a) en un plazo de aproximadamente 50 años (consulte la Figura 32, MW-12 del informe sobre el Análisis de las alternativas de cierre, que se publicó en el sitio web de MWG el 9 de mayo de 2023).

Will County Public Meetings
Ponds 1 North, 1 South, 2 South, 3 South
June 7-8, 2023

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cegue.104@gmail.com	Cesar Guerrero	Yes