ANNUAL REPORT

ANNUAL INSPECTION REPORT

GREAT RIVER ENERGY – COAL CREEK STATION

Drains Pond System CCR Surface Impoundment

Submitted to: Great River Energy
Coal Creek Station
2875 Third Street SW
Underwood, North Dakota 58576

Submitted by: Golder Associates Inc.
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Suite 300
Lakewood, Colorado 80228

January 2018 **1772255**

Golder Associates

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1.0 INTRODUCTION

As part of 40 CFR Part 257 of the Subtitle D solid waste provisions under the Resource Conservation and Recovery Act (RCRA), utilities are required to complete annual inspections for surface impoundments and landfills containing Coal Combustion Residuals (CCR). This report has been prepared by Golder Associates Inc. (Golder) for Great River Energy (GRE) to satisfy the annual inspection requirements for CCR surface impoundments under 40 CFR Part 257.83.

Coal Creek Station (CCS) is located in McLean County, approximately 10 miles northwest of Washburn, North Dakota. There are four facilities located at CCS that fall under the CCR rule requirements (Figure 1):

- Drains Pond System CCR Surface Impoundment (Drains Pond System)
- Upstream Raise 91 CCR Surface Impoundment (Upstream Raise 91)
- Upstream Raise 92 CCR Surface Impoundment (Upstream Raise 92)
- Southeast Section 16 CCR Landfill (Southeast 16)

Upstream Raise 91 and Upstream Raise 92 both operate as impoundments and will be closed with CCR in-place. The Drains Pond System is currently being used to dewater bottom ash and as a process water impoundment to return conveyance water back to the plant. The Southeast 16 landfill operates as a landfill and is used as a storage/disposal facility for CCRs that do not contain free liquid. This report presents a review of available facility information and findings of the inspection of the Drains Pond System at CCS performed September 21, 2017.

2.0 REVIEW OF EXISTING INFORMATION

2.1 Geological Conditions

The Drains Pond System is generally constructed over a glacial till layer consisting of sandy and silty-clay soils. Glacial till varies in thickness from 20 feet to several hundred feet in the area of Coal Creek Station. Silty-sand and sand lenses are present throughout the glacial till formation, which is underlain by poorly consolidated siltstone/sandstone bedrock (Barr Engineering 1982; CPA and UPA 1989).

2.2 Facility Location and Operation

The Drains Pond System (Figure 2) is located in Section 17, Township 145N, Range 82W and covers approximately 22 acres. The Drains Pond System is designed with three interconnected cells (west cell, center cell, east cell) that may be used to dewater CCRs including bottom ash, economizer ash, and rejects. The Drains Pond System is part of the plant process water storage inventory and acts as a clarifier for the process water conveyed with the CCRs.

At the time of the inspection, all three cells were in service. The three interconnected cells are designed to work as follows:

- The west cell is the deposition location for hydraulically conveyed bottom ash, economizer ash, and rejects. These materials are allowed to passively dewater in this shallow cell before being hauled away to an alternate landfill or impoundment. Conveyance water decants from this cell to the center cell.
- The center cell receives decant conveyance water from the west cell as well as plant drains water and stormwater run-off from plant areas. This cell increases the residence time and area to allow for more settling of particles from the CCR conveyance water and plant drains water before water flows to the east cell.
- The east cell receives water from the center cell as well as CCR conveyance water/contact water from other CCR facilities, including Southeast 16 and Upstream Raise 91. This cell provides final clarification and the head and flow to the pumps that recirculate water back to the plant for CCR conveyance.

Lower Samuelson Slough is approximately 400 feet east of the Drains Pond System and a drainage ditch and pumphouse are located north of the facility. The Drains Pond System is adjacent to and directly east of rail lines and is north of a stormwater drainage area and Upstream Raise 91.

2.3 Site History and Liner Systems

The west cell and center cell were constructed in 2015. The west cell has a double composite liner with a drainage system between. The liner system from bottom to top consists of 2 feet of clay, a 60-mil HDPE geomembrane liner, a geocomposite drainage layer, a geosynthetic clay liner (GCL), and a 60-mil HDPE geomembrane liner. This system is overlain with 2 feet of fly ash protective cover. The center cell has a composite liner consisting of 2 feet of clay and a 60-mil HDPE geomembrane liner overlain with 2 feet of fly ash protective cover. Selected construction drawings from the 2015 work are included in Appendix A.

The east cell was originally part of the South Ash Pond, which was built in the late 1970s on a foundation of re-compacted site soils (glacial tills) and put into service in 1979.The South Ash Pond was taken out of service and the east cell of the Drains Pond System was separated with a berm and lined in 1993 with a composite liner consisting of a 2-foot thick clay layer and a 40-mil high density polyethylene (HDPE) geomembrane liner. The liner is overlain with 1 foot of sand, and bottom ash or fly ash protective cover. Selected construction drawings from the 1993 work are included in Appendix A.

2.4 Site Geometry

The berms surrounding the Drains Pond System have an elevation between 1922 feet above mean sea level (amsl) and 1936 feet amsl. The upstream slopes for all three cells are sloped at 3:1, and the berm downstream slopes are sloped at approximately 3:1.

The floor of the west cell varies between 1920 feet amsl and 1927 feet amsl, the floor of the center cell varies between 1908 and 1915 feet, and the floor of the east cell varies between 1900 feet amsl and 1906 feet amsl. The upstream slopes are protected with riprap and hardened fly ash to the bottom of the cells. The perimeter crest of the surrounding berms on the north side is a gravel surfaced roadway supporting both light passenger vehicles and heavy construction equipment, such as Caterpillar 777 haul trucks. The crest of the perimeter berms on the south and west sides are engineered haul roads constructed with beneficially re-used CCRs (fly ash and bottom ash) supporting both light passenger vehicles and heavy construction equipment, such as Caterpillar 777 haul trucks. The perimeter crest on the east side and intercell access roads are gravel surfaced and support mostly light passenger vehicles. The berm downstream slopes have grass vegetation.

2.5 Changes in Geometry

No significant changes to geometry were noted.

2.6 Storage Capacity and Volumes

The west cell is a temporary dewatering and containment area for bottom ash, rejects, and economizer ash. At the time of inspection, approximately 52,000 cy of bottom ash was present within the west cell. Approximately 23,000 cy of this material was placed in the west cell as protective cover and to direct conveyance water as desired to promote bottom ash sedimentation occurring prior to reaching the decant pipes to the center cell. The remaining 29,000 cy of bottom ash is stockpiled material that will be passively dewatered and transferred to an adjacent landfill or impoundment for permanent storage.

The center cell does not directly receive CCR materials. The plant drains contribute a small inflow of solids from the plant. At the time of inspection, approximately 6,000 cy of plant drains solids (sediment) were present (mostly in the southeast corner and northwest corner of the center cell). This sediment will be cleaned out as required to promote flow and allow for uninterrupted cell operations.

The east cell is not intended to store CCR and no appreciable amount of CCR storage was observed. However, the east cell did contain considerable sediment from the existing plant drains inflow piping. The amount of sediment in the east cell is estimated at approximately 70,000 cy. The sediment should be routinely cleaned out to prevent blockage of the outlet pipe and conveyance of solids in the recirculation water back to the plant.

2.7 Impounded Water

The three cells of the Drains Pond System were in operation at the time of the inspection. The operating water level within the west cell has a constant elevation maintained by two 24-inch HDPE decant pipes that transfer water to the center cell. The decant pipes are set to maintain the water in the west cell at an approximate elevation of 1928 feet amsl. Based on as-built surveys and observed CCR deposition, the volume of impounded water at the time of the inspection was approximately 9 acre-feet or 2,900,000 gallons. The maximum depth of water in the west cell was approximated to be 6 feet.

The center cell is hydraulically connected to the east cell by three 24-inch diameter submerged cross-over pipes and generally has a water level approximately 0.5 feet higher than the east cell, where the outlet from the Drains Pond System is located. At the time of inspection, the water level in the center cell was at an approximate elevation of 1916.5 feet amsl. Based on as-built surveys, bathymetry surveys collected in June of 2017, and sediment accumulation within the east cell, the volume of impounded water at the time of the inspection was approximately 8 acre-feet or 2,700,000 gallons. The maximum depth of water in the center cell was approximated to be 6 feet.

The east cell water level is typically managed between elevation 1916 feet amsl and 1918 feet amsl (4 to 6 feet freeboard). Through 2017, the minimum recorded water elevation was 1915.3 feet amsl and the maximum recorded water elevation was 1917 feet amsl. At the time of observations, the water level was at an approximate elevation of 1916 feet amsl. Based on an estimated amount of sediment contained within the facility footprint, the volume of impounded water at the time of the inspection was approximately 21 acre-feet or 6,800,000 gallons. The maximum depth of water in the east cell was approximated to be 10 feet based on as-built surveys, sediment deposition, and the operating level during the evaluation.

2.8 Permits

The Drains Pond System is currently permitted with the North Dakota Department of Health (NDDH) under Permit Number 0033. Previous permit modification documents describe additional historical information about the design of the facility (CPA 1997, CPA and UPA 1989, GRE 2003, GRE 2012, GRE 2015).

2.9 Summary of 2017 Weekly Inspections

Routine weekly inspections of the Drains Pond System were performed as a part of the final CCR Rule. Based on a review of the available inspection forms, the following items were noted:

- Generally good site maintenance.
- No signs of significant seepage, settlement, or cracking of the berm downstream slopes.
- Fugitive dust actively controlled using a water truck (as required).

2.10 Summary of Previous Inspections

The most recent annual professional engineer inspection of the Drains Pond System was performed by Golder in 2016 (Golder 2017). A summary of the observations of that inspection are as follows:

- Generally good vegetation and site maintenance.
- No signs of significant seepage, settlement, or cracking of the berm downstream slopes.
- Small animal burrows up to approximately two inches in diameter on berm downstream slopes.
- Minor rutting of the gravel roadways on the crest was noted after a rain event.
- Debris was accumulating at the inlet of the decant pipelines between the west cell and center cell.

3.0 2017 ANNUAL INSPECTION

On September 21, 2017, Ryan Shedivy of Golder performed an inspection of the Drains Pond System per United States Environmental Protection Agency (USEPA) Regulation 40 CFR Part 257.83(b) requirements. The inspection consisted of visual observations while walking around the facility traversing up and down the perimeter berm. An annual inspection checklist used during the inspection is presented in Appendix B. Photographs were taken and are presented in Appendix C. The following presents a summary of the observations made during the 2017 annual inspection.

3.1 Hydraulic Structures

Inflow structures to the Drains Pond System consist of drainage cross-over pipes from Upstream Raise 91, gravity drain piping from the plant drains, and ash lines conveying bottom ash, rejects, and economizer ash. An armored downchute channel along the north side of the center cell allows runoff from plant surface water drainage channels to flow into the center cell as well. Additional internal pipelines connect the three cells that are a part of the Drains Pond System:

- Decant pipes transfer water from the west cell to the center cell.
- Passive drainage pipes connect the sumps within the west cell to the center cell.
- Cross-over piping connects the center cell to the east cell and Upstream Raise 91 to the east cell.

The cross-over pipelines between Upstream Raise 91 and the east cell and the center cell and the east cell are buried and below the water level and could not be observed. The above-ground pipes observed appeared to be in good condition with no noticeable settlement, cracking, significant corrosion, or significant erosion. Screens were removed from the inlets of the decant pipelines between the west cell and center cell after the 2016 inspection and debris was no longer collecting at these pipe inlets. The downchute channel on the north side of the center cell is also in good condition. The outflow structures from the Drains Pond System consist of submerged outlet pipes in the northeast corner of the center cell and the northwest corner of the east cell that feed water to the Drains Pond Transfer Pumphouse located to the north. These pipe penetrations were below the water level and could not be observed.

3.2 Berm Upstream Slope

The observable berm upstream slopes appeared to match the design slopes of 3:1 with no observed sections of significant slope movement. The berm upstream slope along the south and west sides of the west cell were below temporarily stacked bottom ash materials and were not visible during the inspection. Center cell slopes and the east berm upstream slopes of the west cell are protected from erosion with a 1- foot thick fly ash layer from the floor to the embankment crest as well as riprap within the normal operating levels of the cells. At the time of inspection, the riprap and fly ash appeared to be in good condition. Minor erosion in the riprap was observed, especially on the west berm upstream slope of the center cell.

East cell slopes are being protected from erosion with a cemented fly ash layer from the floor up to the embankment crest. This cemented fly ash layer overlies a geotextile and a 1-foot protective sand layer and appeared to be competent. The water level is typically managed between elevation 1916 feet amsl and 1918 feet amsl (4 to 6 feet freeboard). At the time of observations, the water level was approximately at elevation 1916 feet amsl. The berm upstream slopes of the east cell appear to be in good condition; however, the south side had an area of erosion where geotextile was exposed.

3.3 Berm Crest

The crest of the perimeter berm on the north side is a gravel surfaced roadway supporting both light passenger vehicles and heavy construction equipment, such as Caterpillar 777 haul trucks. The berm crest on the south and west sides is an engineered haul road constructed with beneficially re-used CCRs (fly ash and bottom ash) supporting both light passenger vehicles and heavy construction equipment, such as Caterpillar 777 haul trucks. The berm crest on the east side experiences little heavy traffic and is mostly exposed to light vehicle traffic (cars, pickups, etc.). The roads surrounding the Drains Pond System appear to be in good condition, with no noticeable cracking or settlement, and appear to be well maintained. When wet, gravel road surfaces can become rutted and slippery. Ruts that develop on the road surface should be repaired as soon as possible to maintain access.

3.4 Berm Downstream Slope

The berm downstream slopes of the Drains Pond System range from 0 to 22 feet in height. The berm downstream slopes of the west cell range from 0 to 11 feet in height. The west cell shares its east berm with the center cell, although the shared berm has a berm downstream slope from the elevated west cell down to the lower center cell. This berm appeared to be in good condition at the time of inspection and grass was beginning to establish on the slope after being seeded in 2015. The topography is shallow to the west with no apparent berm downstream slope. The north and south berm downstream slopes are heavily vegetated with native grasses. Two low areas (one on the north side of the west cell and one on the south side of the west cell) are collecting runoff from intermediate berm downstream slopes and/or surface water drainage ditches near the west cell and should be graded to allow water to drain from berm downstream slopes into surrounding surface water drainages. Golder did not observe indications of seepage, sloughing, cracking, significant erosion, excessive settlement, or vegetation that seemed to be thriving abnormally. The berm downstream slope of the west cell appeared to be in good condition.

The berm downstream slopes of the center cell range from 0 to 22 feet in height. The center cell shares its east berm with the east cell and its west berm with the west cell. The north and south berm downstream slopes are heavily vegetated with native grasses. Golder did not observe indications of seepage, sloughing, cracking, significant erosion, excessive settlement, or vegetation that seemed to be thriving abnormally. The berm downstream slope of the center cell appeared to be in good condition.

The east cell shares its south berm with Upstream Raise 91 and its west berm with the center cell. The topography is fairly shallow to the north with no apparent berm downstream slope. The berm downstream slope on the east side had a good stand of grass with no indications of seepage, sloughing, cracking, significant erosion, excessive settlement, or vegetation that seemed to be thriving abnormally. The berm downstream slopes of the east cell appeared to be in good condition.

3.5 Toe

The toe of the north, east, and south slopes of the Drains Pond System were covered with tall grass and reeds (south toe of slope) with no indications of seepage, sloughing, cracking, significant erosion, settlement or abnormally thriving vegetation. The toe appeared to be in good condition.

3.6 Signs of Structural Weakness or Other Observations that Could Affect Stability

No signs of structural weakness or other observations that could affect the stability of the Drains Pond System were observed during the site inspection in September 2017.

4.0 SUMMARY AND CONCLUSIONS

An annual inspection was performed for the Drains Pond System at Coal Creek Station on September 21, 2017. The inspection met the requirements for CCR surface impoundments under 40 CFR Part 257.83. The inspection included the Drains Pond System (east cell, center cell, and the west cell). Golder observed good vegetation and site maintenance and did not identify significant deficiencies such as seepage, excessive erosion or settlement, or cracking during visual observations of the Drains Pond System.

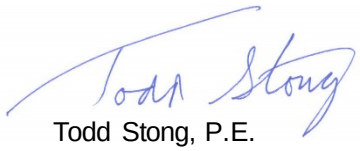
Personnel involved in CCR handling and operations at the Drains Pond System are instructed on an annual basis in specific procedures to ensure compliance with the permits, facility plans, and appropriate NDDH and USEPA regulations to prevent accidents and environmental impacts. In addition to annual inspections by the Professional Engineer, trained and qualified site personnel will perform the required weekly facility inspections to look for signs of potential structural weaknesses.

Minor maintenance items that may need to be continually addressed include repairing ruts that develop within the crest roads, repairing eroded areas of the berm upstream slope fly ash and riprap protection layers, monitoring berm downstream slopes for large animal burrows or erosion that may affect operations and reseeding as required, and removing sediment that accumulates within the facilities that negatively impacts operations. In addition, the inflow and outflow piping should be monitored regularly to ensure proper conveyance of water to and from the facility.

GOLDER ASSOCIATES INC.

Ryan Shedivy, P.E.
Project Engineer

Craig Schuettpelz, P.E.
Senior Project Engineer



Todd Stong, P.E.
Associate/Senior Consultant

5.0 REFERENCES

Barr Engineering. 1982. Coal Creek Station Hydrogeologic Study, June 3, 1982.

Cooperative Power Association. CPA 1997. Application to Renew Permit SU-033 and Combine with Permit SU-118. Eden Prairie, Minnesota, July 30, 1997.

Cooperative Power and United Power Association. CPA and UPA 1989. *Application to Renew Permit to Operate a Special Use Disposal Site, Coal Creek Station, Permit Number SU-033*. Prepared for the North Dakota State Department of Health and Consolidated Laboratories.

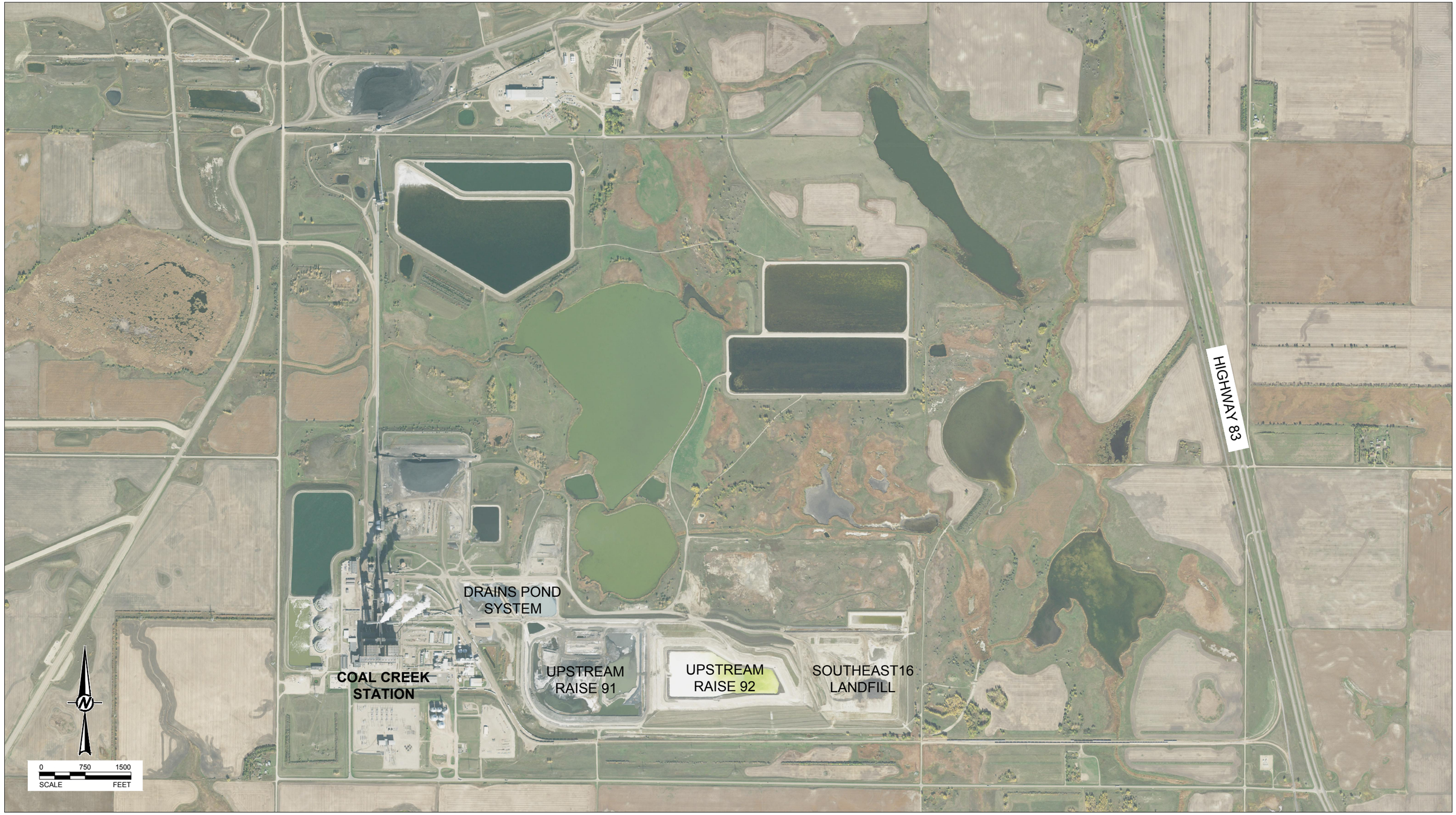
Golder Associates Inc. Golder 2017. Annual Inspection Report – Great River Energy – Coal Creek Station – Drains Pond System. January 2017.

Great River Energy – Coal Creek Station. GRE 2003. Permit Modification Document, Permit No. SP-033. Original Permit Modification submitted September 30, 2003. Revised Permit Modification submitted to NDDH on July 8, 2004.

Great River Energy – Coal Creek Station. GRE 2012. Permit Modification Document, Permit No. SP-033. Original Permit Modification dated December 12, 2012.

Great River Energy – Coal Creek Station. GRE 2015. Permit Modification Document, Permit No. SP-033. Original Permit Modification dated February, 2015.

FIGURES



REFERENCES

1. AERIAL IMAGE FROM UNITED STATES DEPARTMENT OF AGRICULTURE NATIONAL AERIAL IMAGERY PROGRAM, PUBLISHED 2017.

CLIENT
GREAT RIVER ENERGY
COAL CREEK STATION
UNDERWOOD, NORTH DAKOTA

CONSULTANT
Golder Associates

YYYY-MM-DD	2017-12-12
DESIGNED	RFS
PREPARED	KAC
REVIEWED	CCS
APPROVED	TJS

PROJECT
2017 ANNUAL INSPECTION REPORT

TITLE
COAL CREEK STATION SITE OVERVIEW

PROJECT NO.	REV.	FIGURE
1772255	A	1

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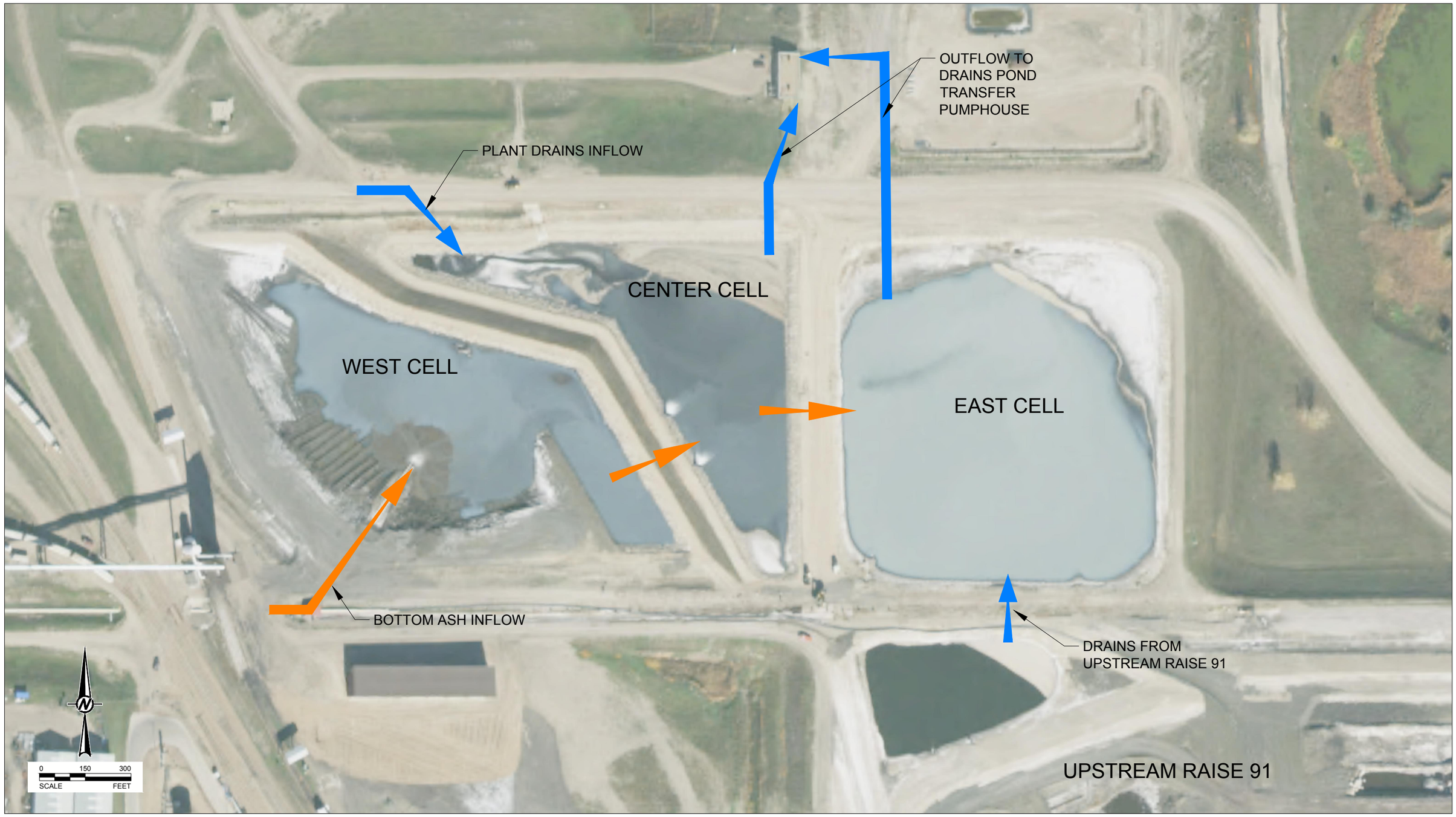


REFERENCES

1. AERIAL IMAGE FROM UNITED STATES DEPARTMENT OF AGRICULTURE NATIONAL AERIAL IMAGERY PROGRAM, PUBLISHED IN 2017.

CLIENT
GREAT RIVER ENERGY
COAL CREEK STATION
UNDERWOOD, NORTH DAKOTA

CONSULTANT
Golder Associates

YYYY-MM-DD	2017-12-12
DESIGNED	CCS
PREPARED	KAC
REVIEWED	RFS
APPROVED	TJS

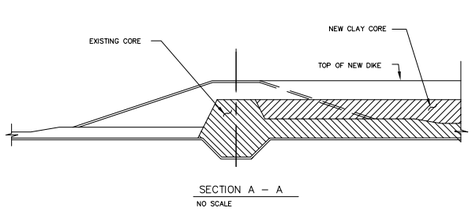
PROJECT
2017 ANNUAL INSPECTION REPORT

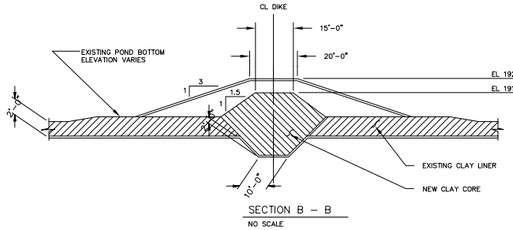
TITLE
DRAINS POND SYSTEM
SITE OVERVIEW

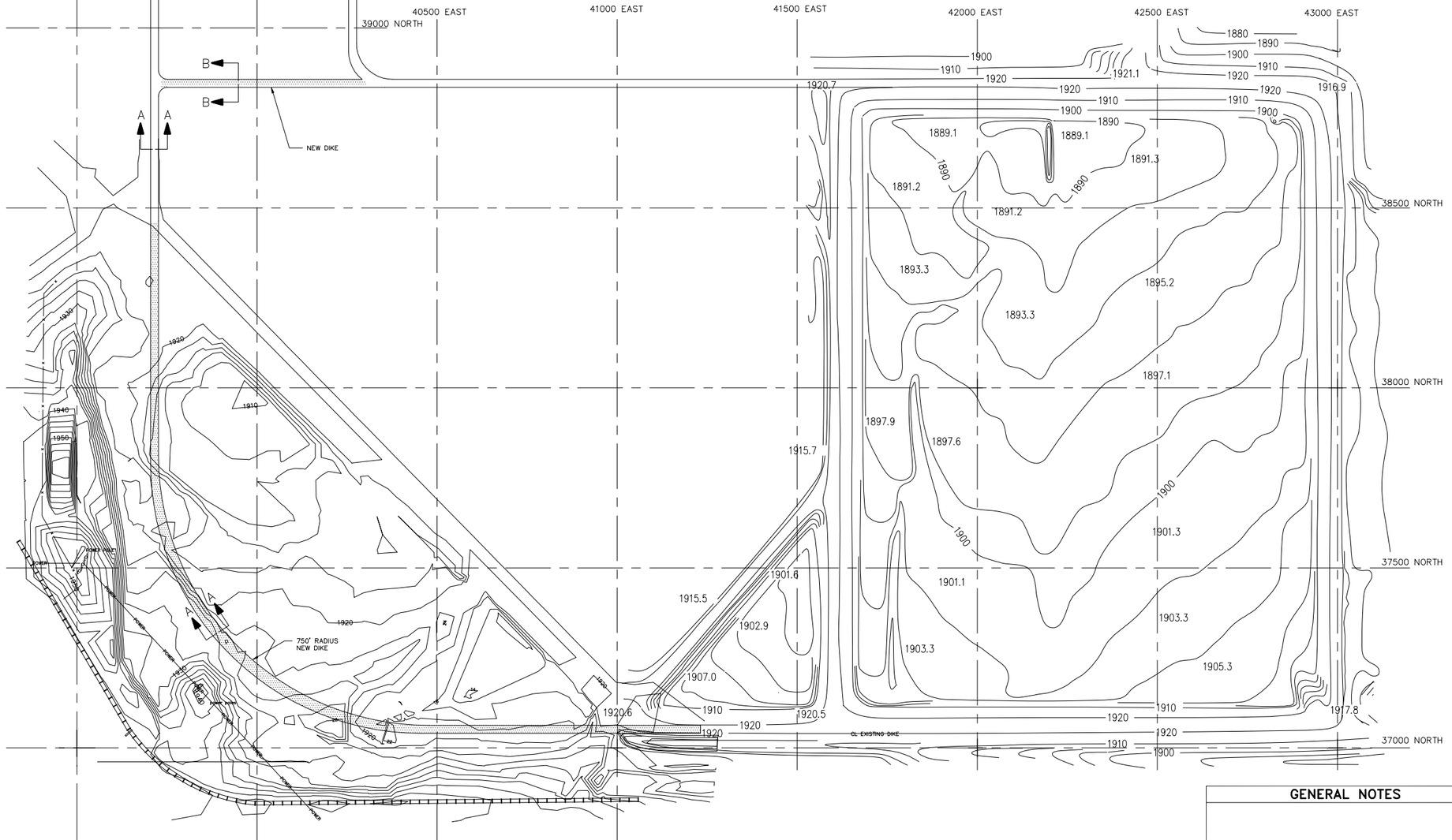
PROJECT NO.	REV.	FIGURE
1772255	A	2

APPENDIX A

SELECTED CONSTRUCTION DRAWINGS AND PERMIT DRAWINGS







GENERAL NOTES

DRAWING NO.	REVISION	REFERENCE DRAWINGS

DWN. JJ	CHK.
DATE 01/07/91	
W/O 91G105	

SOUTH ASH POND–
SECTIONS AND ELEVS

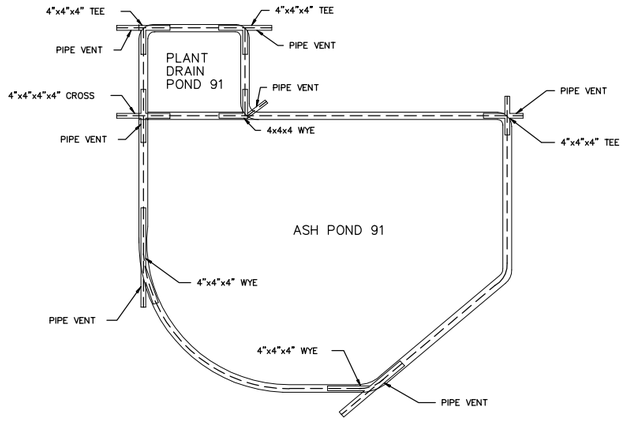
1991 ASH DISPOSAL

DRAWING NO.
91G105-26

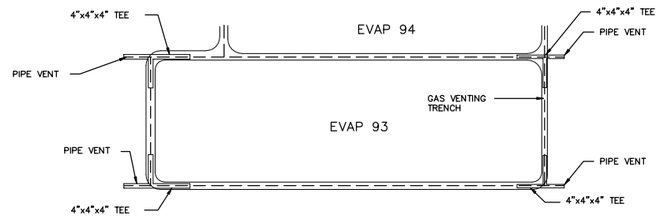
COOPERATIVE Association POWER

DATE	REVISIONS AND RECORD OF ISSUE	NO.	BY	CK.	APP
02/27/91	ISSUED FOR CONSTRUCTION	1	RR	AS	
01/18/91	ISSUED FOR BID	0	JJ	AS	

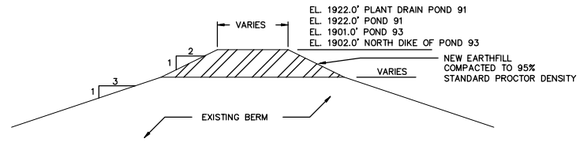
N



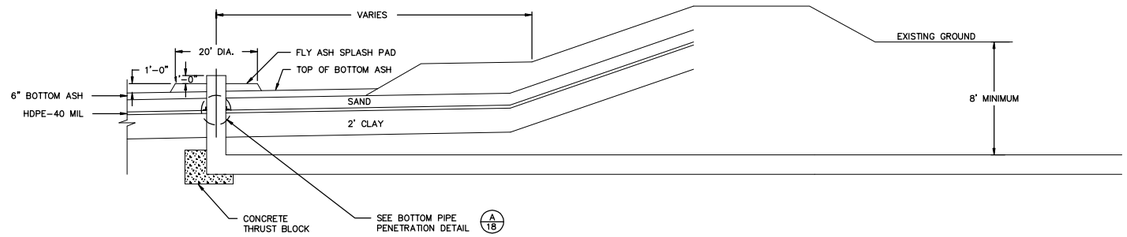
1/16 GAS PIPING AND TRENCH LAYOUT ASH POND 91
NOT TO SCALE



2/16 GAS PIPING AND TRENCH LAYOUT EVAPORATION POND 93
NOT TO SCALE



3/16 BERM RAISING DETAIL
NOT TO SCALE



4/16 EVAPORATION POND 93 INLET DETAIL
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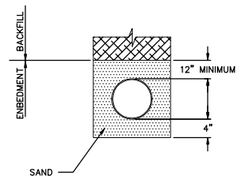

TYPICAL PIPE BEDDING
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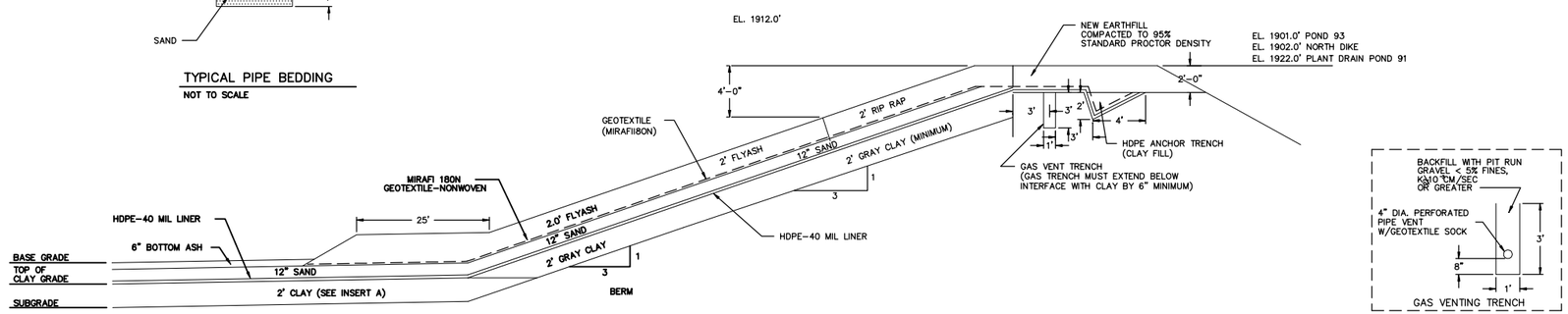


INSERT A

6" GRAY CLAY

18" BROWN CLAY

5/16 TYPICAL BERM & BOTTOM SECTION
EVAPORATION POND 93 AND PLANT DRAIN POND 91
NOT TO SCALE

NOTE:
1. PROVIDE PERFORATED PIPE VENTS (PVC-SHED40), EACH APPROX. 120' LONG AND 4" DIA. IN THE GAS VENTING TRENCHES. THE EXACT LENGTHES TO BE DETERMINED BY SITE REPRESENTATIVE.
2. THE EXPOSED ENDS OF 4" DIA. GAS VENTING PIPE SHALL BE PROTECTED WITH BOTH A 1/2" STAINLESS STEEL SCREEN AND REGULAR SCREENING MATERIALS.

DATE	REVISIONS AND RECORD OF ISSUE	NO.	BY	CK.	APP
06-23-92	REVISED EVAP POND 93 DIKE ELEVATION	2	BK	AS	AS
03-16-92	ISSUED FOR CONSTRUCTION	1	BK	AS	AS
01/09/92	ISSUED FOR BID	0	BK	AS	AS

GENERAL NOTES

DRAWING NO.	REVISION	REFERENCE DRAWINGS

DWN. BAK CHK.
DATE 12/26/91
W/O 92G213

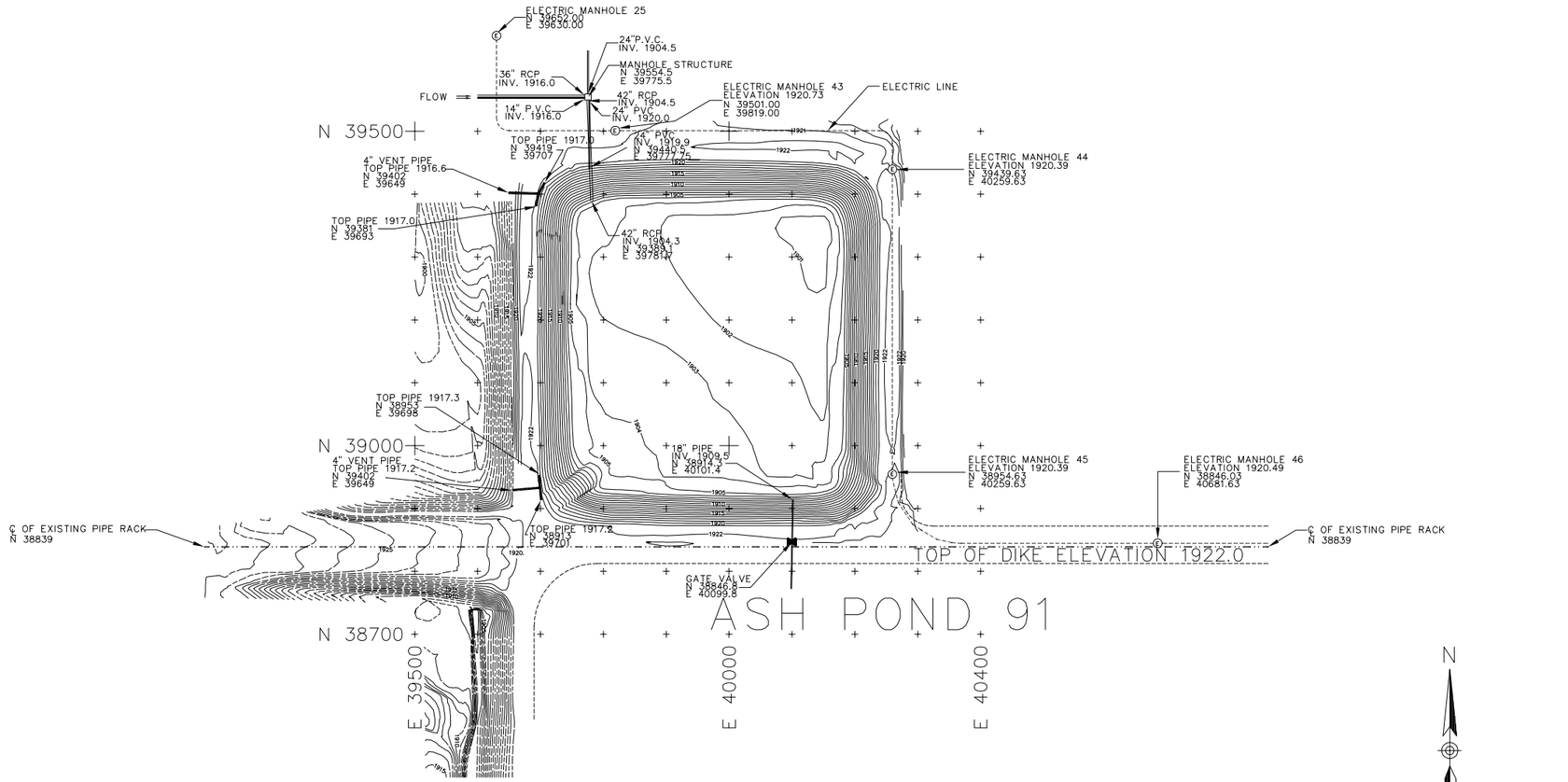
TYPICAL SECTIONS AND DETAILS

1992 ASH DISPOSAL

DRAWING NO. 92G213-16

COOPERATIVE Association POWER

PLANT DRAIN
FINAL CONTOURS



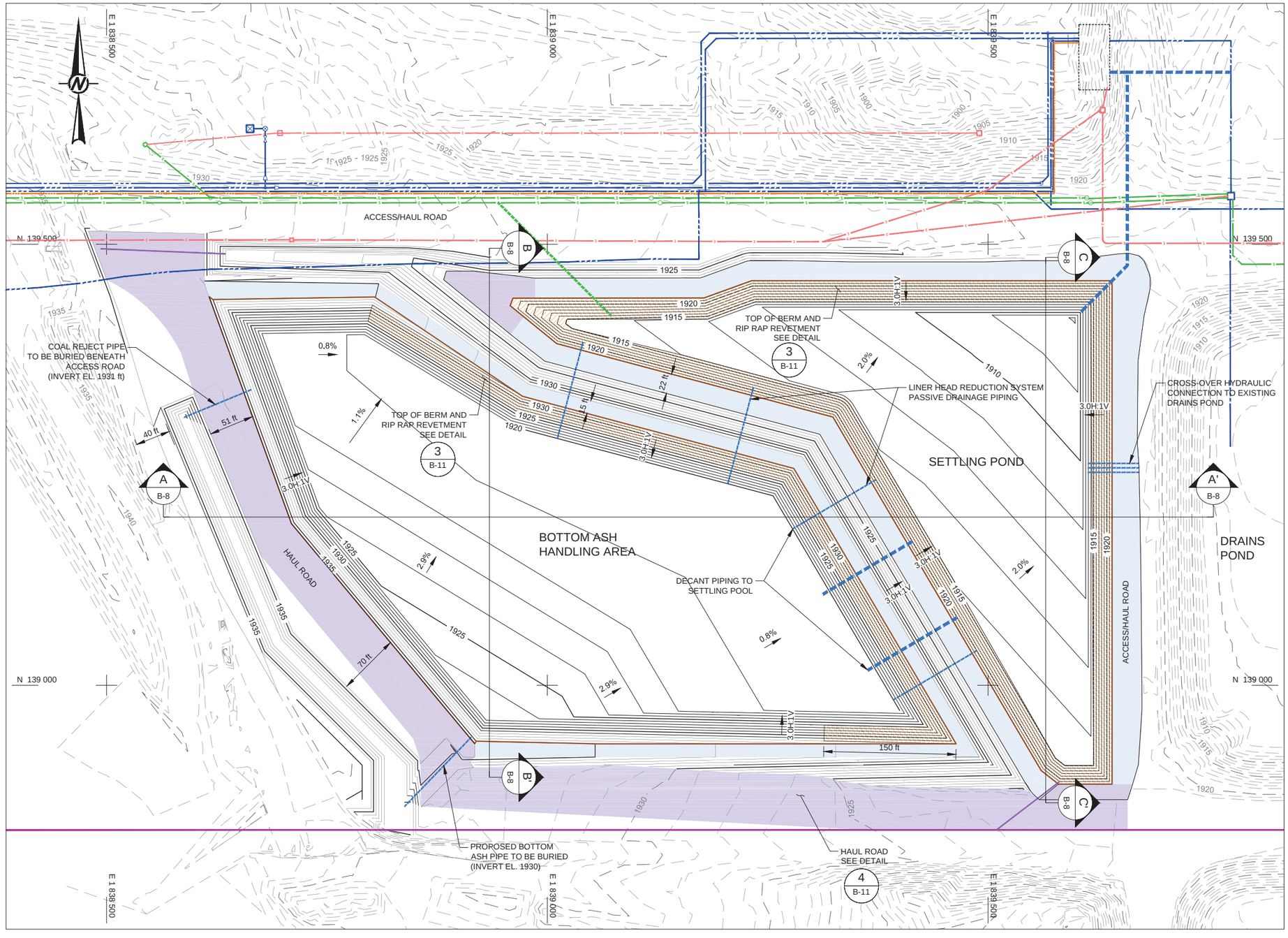
Revision No.	Date	By	Description

COOPERATIVE POWER ASSOCIATION
UNDERWOOD, NORTH DAKOTA

PLANT DRAIN FINAL CONTOURS

Drawn By D.B.J. Project No. B92-17-02
Checked By L.H.K Date 1/10/94

interstate engineering, inc.
Engineering - Surveying - Planning



LEGEND

- EXISTING GROUND TOPOGRAPHY (SEE REFERENCE 2)
- FINAL GRADES (NOTE 1)
- RIP RAP REVETMENT
- 8-INCH GRAVELACCESS ROAD
- 2-FEET COARSE GRAVEL HAUL ROAD
- EXTENTS OF FLY ASH PROTECTIVE COVER (NOTE 1)
- EXISTING WATER LINE
- EXISTING ASH LINE
- EXISTING DRAIN LINE
- EXISTING ELECTRICAL
- EXISTING COMPRESSED AIR LINE
- PROPOSED PIPING

NOTES

1. GRADES WITHIN THIS BOUNDARY LINE REPRESENT THE TOP OF THE PROTECTIVE COVER (LINED AREAS). GRADES OUTSIDE OF THIS BOUNDARY LINE REPRESENT THE TOP OF ACCESS ROADS AND BERMS.

REFERENCE(S)

1. SITE LOCATION: SECTION 17, T145N, R82W, MCLEAN COUNTY, NORTH DAKOTA.
2. EXISTING GROUND TOPOGRAPHY WAS PROVIDED BY GREAT RIVER ENERGY. THE SURVEYS WERE PERFORMED BETWEEN 1996 AND 2011 EXCEPT DRAINS POND AS-BUILT TOP OF LINER SYSTEM GRADES, WHICH WERE SURVEYED BY INTERSTATE ENGINEERING, INC. AND ARE REFERENCED FROM A SURVEY DRAWING PROVIDED BY GREAT RIVER ENERGY, DATED JANUARY 10, 1994.
3. LOCATIONS OF EXISTING UTILITIES WERE PROVIDED BY GREAT RIVER ENERGY.
4. COORDINATES ARE BASED ON THE PLANT GRID SYSTEM.
5. THE CONTOUR INTERVAL IS ONE FOOT.
6. ALL PROPERTY SHOWN ON THIS MAP IS OWNED BY GREAT RIVER ENERGY.

0 60 120
SCALE FEET

REV.	YYYY-MM-DD	DESCRIPTION	DESIGNED	PREPARED	REVIEWED	APPROVED
0	2015-06-12	ISSUED FOR CONSTRUCTION	RFS	RFS	CCS	TJS
A	2015-05-22	ISSUED FOR BID	RFS	RFS	CCS	TJS

SEAL

REGISTERED PROFESSIONAL ENGINEER — TODD J. STONG — PE-5144 — NORTH DAKOTA — Date 6/11/2015

CLIENT

GREAT RIVER ENERGY

GREAT RIVER ENERGY
COAL CREEK STATION
UNDERWOOD, NORTH DAKOTA

CONSULTANT

GOLDER ASSOCIATES, INC.
44 UNION BLVD, SUITE 300
LAKEWOOD, COLORADO
USA
[+1] (303) 980-0540
www.golder.com

PROJECT
2015 COAL COMBUSTION RESIDUAL FACILITY CONSTRUCTION
SCOPE OF WORK B
DRAINS POND EXPANSION

TITLE
FINAL GRADES

DRAFT

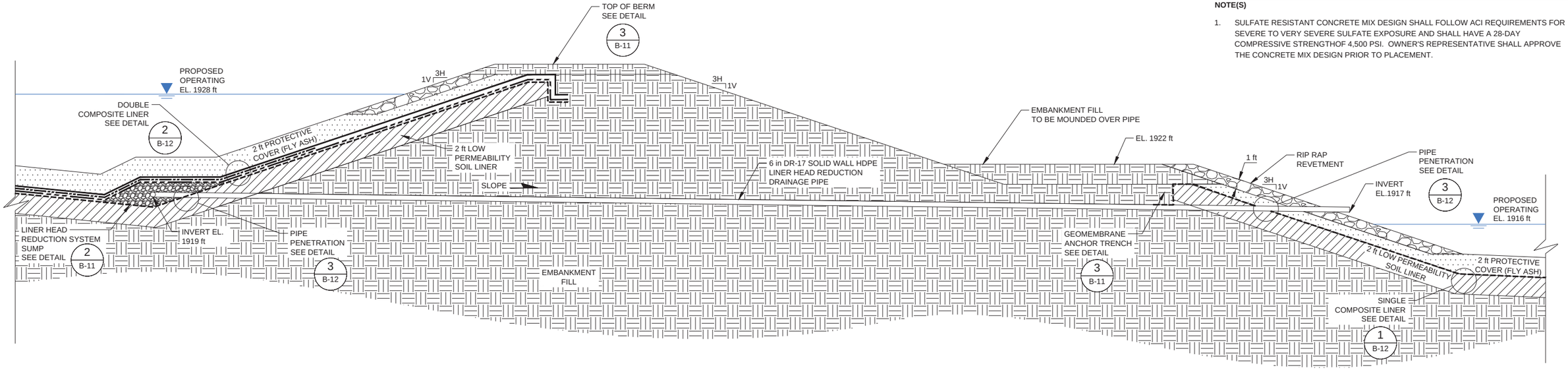
PROJECT NO. 1523661 | REV. 0 | B-7 of B-14 | DRAWING B-7

Path: \\Denver.golder.gds\acad\15\1523661 - GREP\PRODUCTION_B - DRAINS POND EXPANSION\ | File Name: 1523661B007.dwg

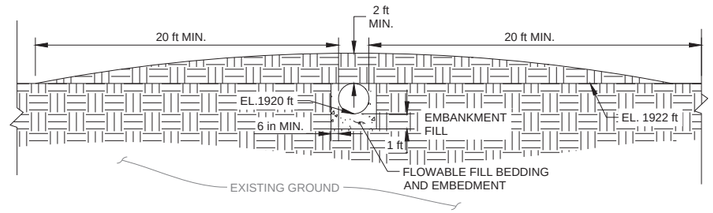
IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI D

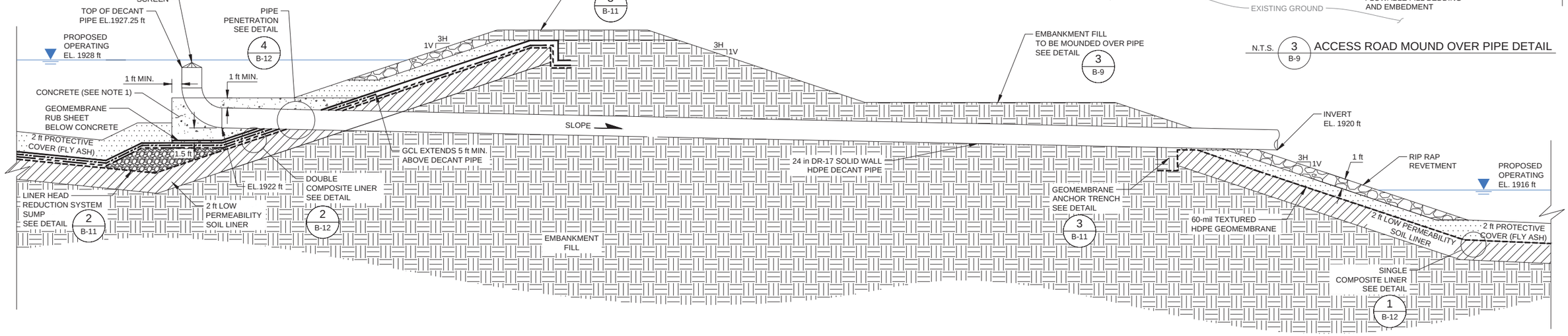
NOTE(S)

1. SULFATE RESISTANT CONCRETE MIX DESIGN SHALL FOLLOW ACI REQUIREMENTS FOR SEVERE TO VERY SEVERE SULFATE EXPOSURE AND SHALL HAVE A 28-DAY COMPRESSIVE STRENGTHOF 4,500 PSI. OWNER'S REPRESENTATIVE SHALL APPROVE THE CONCRETE MIX DESIGN PRIOR TO PLACEMENT.



N.T.S. 1 B-9 LINER HEAD REDUCTION SYSTEM CROSS-OVER PIPE DETAIL





N.T.S. 3 B-9 ACCESS ROAD MOUND OVER PIPE DETAIL

N.T.S. 2 B-9 DECANT PIPE DETAIL

REV.	YYYY-MM-DD	DESCRIPTION	DESIGNED	PREPARED	REVIEWED	APPROVED
0	2015-06-12	ISSUED FOR CONSTRUCTION	RFS	RFS	CCS	TJS
A	2015-05-22	ISSUED FOR BID	RFS	RFS	CCS	TJS

SEAL

REGISTERED PROFESSIONAL ENGINEER
TODD J. STONG
PE-6144
Todd J. Stong
06/11/2015
NORTH DAKOTA

CLIENT

GREAT RIVER ENERGY

GREAT RIVER ENERGY
COAL CREEK STATION
UNDERWOOD, NORTH DAKOTA

CONSULTANT

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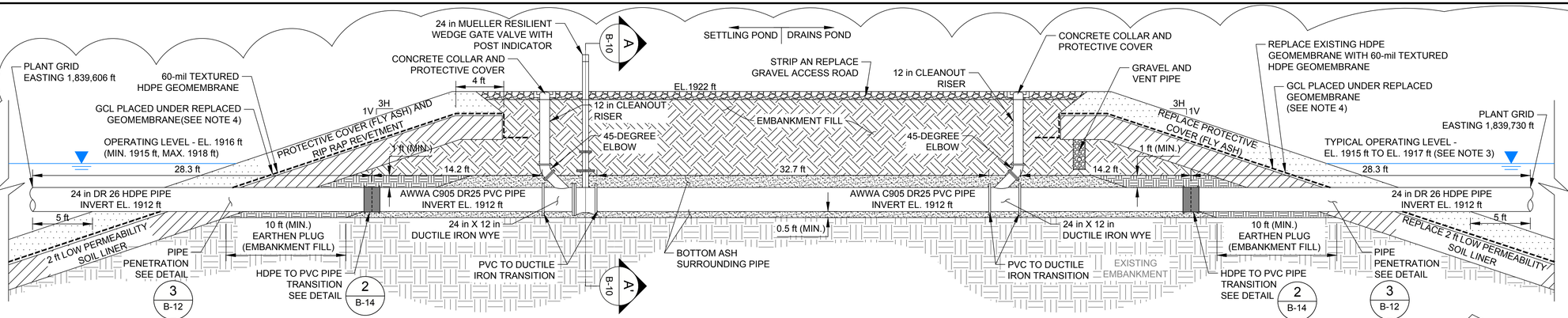
[+1] (303) 980-0540
www.golder.com

PROJECT
2015 COAL COMBUSTION RESIDUAL FACILITY CONSTRUCTION
SCOPE OF WORK B
DRAINS POND EXPANSION

TITLE
DETAILS 1 OF 4

DRAFT

PROJECT NO. 1523661 | REV. 0 | B-9 of B-14 | DRAWING B-9

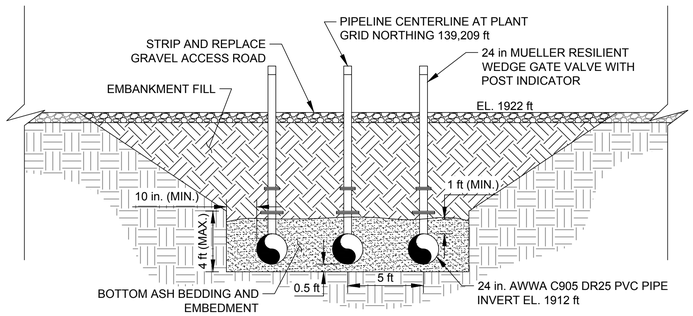


N.T.S. 1 B-10 SETTLING POND TO DRAINS POND CROSS-OVER PIPE DETAIL

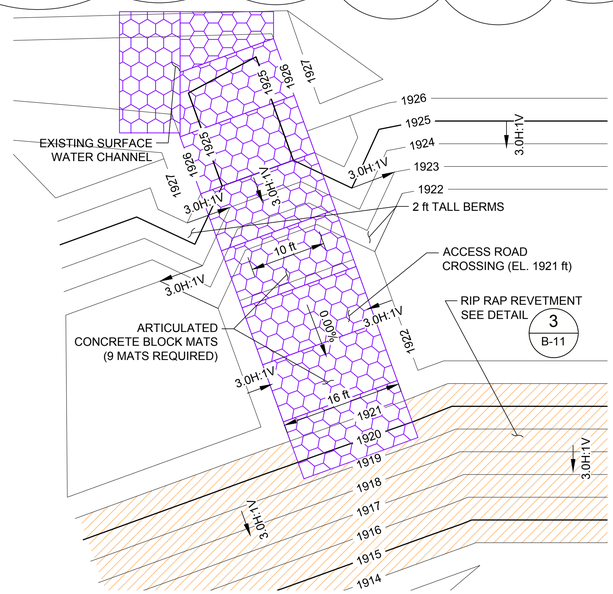
NOTE(S)

1. FLOWABLE FILL SHALL HAVE A 28-DAY COMPRESSIVE STRENGTH OF 100 PSI. OWNER'S REPRESENTATIVE SHALL APPROVE THE FLOWABLE FILL MIX DESIGN PRIOR TO PLACEMENT.
2. PIPE AND FITTINGS SHALL BE INSTALLED FOLLOWING MANUFACTURER'S RECOMMENDATIONS AND APPLICABLE STANDARDS, INCLUDING AWWA M23 AND AWWA C600. DUCTILE IRON FITTINGS SHALL BE WRAPPED WITH POLYETHYLENE SLEEVING BY CONTRACTOR TO PROTECT FROM CORROSION.
3. THE DRAINS POND CURRENTLY OPERATES AT A WATER ELEVATION OF BETWEEN 1915 AND 1917 FEET. A TEMPORARY DAM AND DEWATERING WILL BE REQUIRED TO ALLOW FOR INSTALLATION OF THE PIPING AND WELDING OF GEOMEMBRANE AND THE PIPE BOOT.
4. GCL SHALL BE PLACED UNDER THE GEOMEMBRANE IN AREAS WHERE THE GEOMEMBRANE IS REMOVED FOR PIPE INSTALLATION.

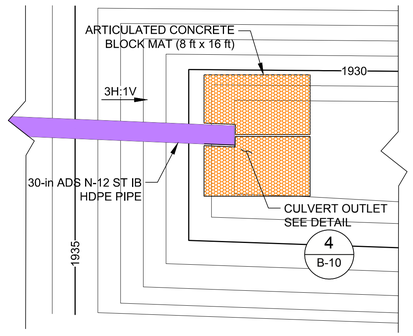
MODIFIED SCOPE



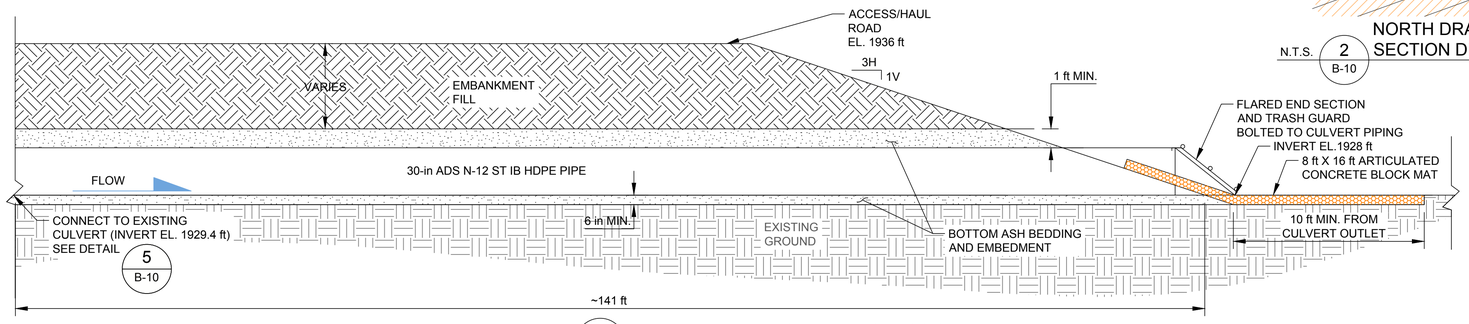
N.T.S. A B-10 SECTION A-A' - SETTLING POND TO DRAINS POND CROSS-OVER PIPE



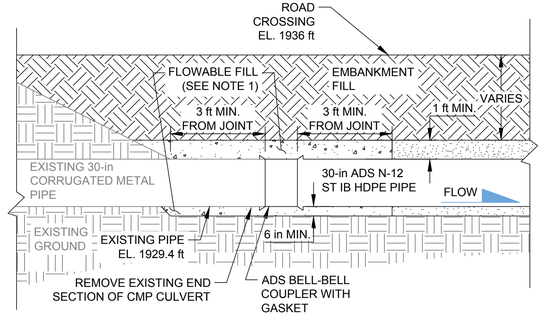
N.T.S. 2 B-10 NORTH DRAINAGE CHANNEL TYPICAL CROSS SECTION DETAIL



N.T.S. 3 B-10 NORTH DRAINAGE CHANNEL CULVERT PLAN VIEW



N.T.S. 4 B-10 NORTH CHANNEL CULVERT CROSS SECTION



N.T.S. 5 B-10 CORRUGATED METAL PIPE TO HDPE PIPE CONNECTION DETAIL

REV.	YYYY-MM-DD	DESCRIPTION	DESIGNED	PREPARED	REVIEWED	APPROVED
2	2015-09-01	REVISED ISSUED FOR CONSTRUCTION	RFS	RFS	CCS	TJS
1	2015-08-11	REVISED ISSUED FOR CONSTRUCTION	RFS	RFS	CCS	TJS
B	2015-07-28	REVISED ISSUED FOR BID	RFS	RFS	CCS	TJS
0	2015-06-12	ISSUED FOR CONSTRUCTION	RFS	RFS	CCS	TJS
A	2015-05-22	ISSUED FOR BID	RFS	RFS	CCS	TJS

SEAL

REGISTERED PROFESSIONAL ENGINEER — TODD J. STONG — PE-6144 — DATE 11/2/2015 — NORTH DAKOTA

CLIENT

GREAT RIVER ENERGY

GREAT RIVER ENERGY
COAL CREEK STATION
UNDERWOOD, NORTH DAKOTA

CONSULTANT

Golder Associates

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44 UNION BLVD, SUITE 300
LAKEWOOD, COLORADO
USA
[+1] (303) 980-0540
www.golder.com

PROJECT
2015 COAL COMBUSTION RESIDUAL FACILITY CONSTRUCTION
SCOPE OF WORK B
DRAINS POND EXPANSION

TITLE
DETAILS 2 OF 4

DRAFT

PROJECT NO. 1523661 | REV. 2 | B-10 of B-14 | DRAWING B-10

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI D

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APPENDIX B
VISUAL OBSERVATIONS

IMPOUNDMENT INSPECTION CHECKLIST

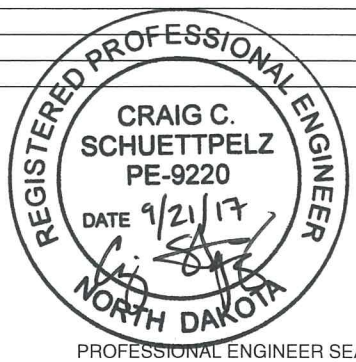
Facility Name: ***Drains Pond System (east cell, center cell, west cell)***
Owner and Address: Great River Energy – Coal Creek Station

Purpose of Facility: CCR Dewatering and process water storage/clarification
Legal: Section 17 ***Township:*** 145N ***Range:*** 82W
County: McLean
Inspected By: Ryan Shedivy ***Inspection Date:*** 09/21/2017
Weather: Mostly sunny, 60-70° F Wind:6 mph E

ITEM	Y	N	N/A	REMARKS
1. General Conditions				
a. Alterations		X		
b. Development of downstream plain		X		
c. Grass cover	X			
d. Settlement/misalignment/cracks		X		
e. High water mark	X			El: 1917.4 ft (east cell)
f. Current water level	X			El: 1916ft (east),1916.5ft (center),1928 ft (west)
g. Sudden drops in water level?		X		
2. Inflow Structure				Ash piping, plant drains
a. Settlement		X		
b. Cracking		X		
c. Corrosion	X			Minor corrosion of ash pipelines
d. Obstacles in inlet		X		
e. Riprap/erosion control	X			Fly ash and riprap
3. Outflow Structure				Submerged
a. Settlement			X	
b. Cracking			X	
c. Corrosion			X	
d. Obstacles in outlet		X		
e. Riprap/erosion control			X	
4. Upstream slope				
a. Erosion – liner exposed?	X			South side of east cell is eroded with exposed geotextile
b. Rodent burrows		X		
c. Vegetation		X		
d. Cracks/settlement		X		
e. Riprap/other erosion protection	X			Fly ash and riprap
5. Crest				
a. Soil condition	X			Firm gravel and CCR roadways
b. Comparable to design width	X			
c. Vegetation		X		
d. Rodent burrows		X		
e. Exposed to heavy traffic	X			CAT 777 haul trucks
f. Damage from vehicles/machinery		X		Rutting and slippery when wet
6. Downstream slope				
a. Erosion	X			North downstream slope near pumphouse
b. Vegetation	X			North, east, and south sides are well-vegetated, recently seeded intercell berm has some vegetation
c. Rodent burrows	X			
d. Cracks/settlement/scarps		X		
e. Drain conditions			X	No drains
f. Seepage		X		
7. Toe				
a. Vegetation	X			
b. Rodent burrows		X		
c. Settlement		X		
d. Drainage conditions			X	
e. Seepage		X		

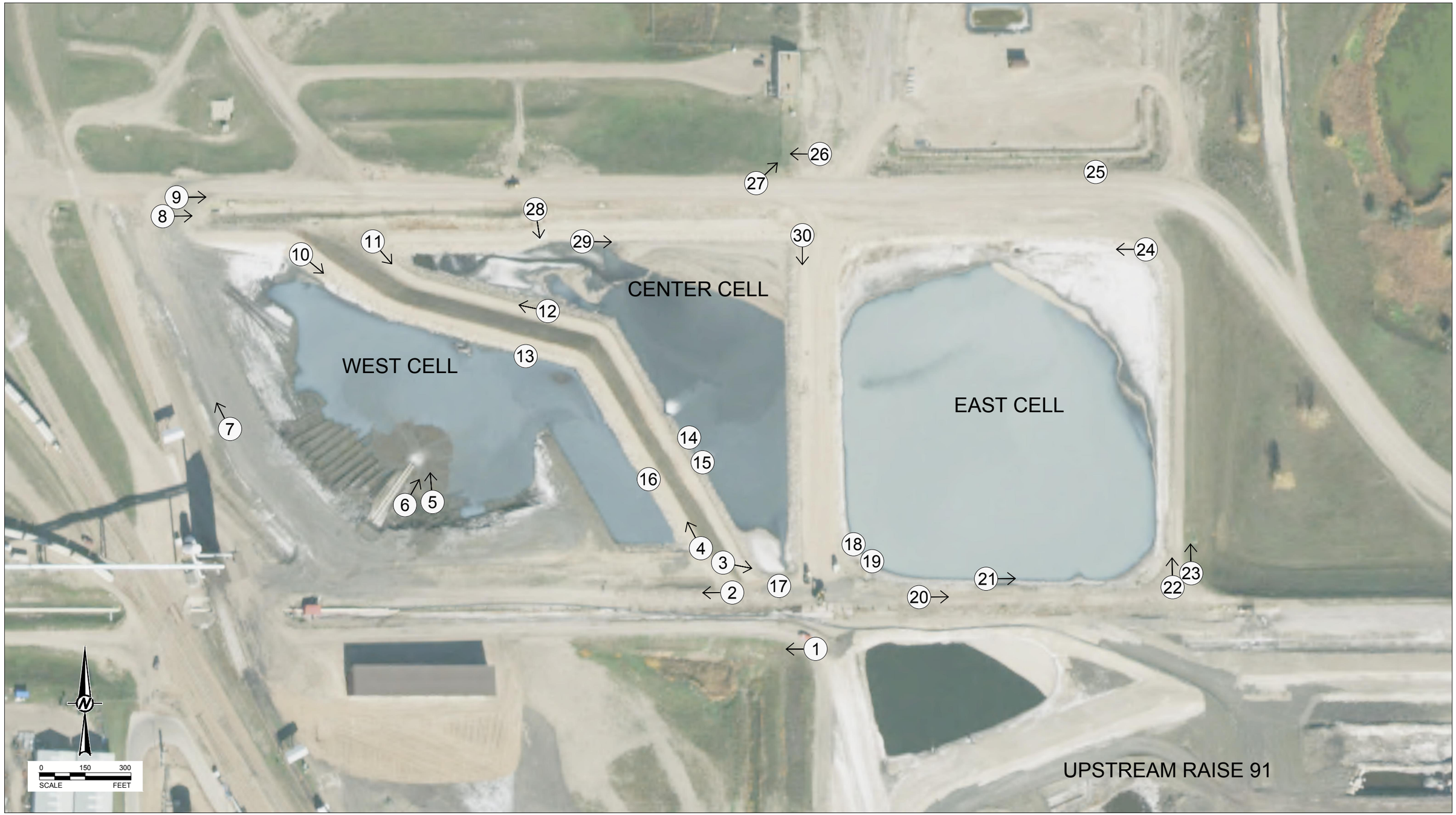
General Remarks: The impoundment is in good condition (no significant. stability concerns). Minor maintenance includes addressing small burrows, maintaining fly ash and riprap protective cover, and addressing erosion as observed.

Name of Engineer: Craig Schuettpelz
Date: 9/21/17
Engineering Firm: Golder Associates Inc.
Signature:



PROFESSIONAL ENGINEER SEAL

APPENDIX C
PHOTOGRAPHS



LEGEND

1 PHOTOGRAPH LOCATION

REFERENCES

1. AERIAL IMAGE FROM UNITED STATES DEPARTMENT OF AGRICULTURE NATIONAL AERIAL IMAGERY PROGRAM, PUBLISHED IN 2017.

CLIENT
GREAT RIVER ENERGY
COAL CREEK STATION
UNDERWOOD, NORTH DAKOTA

CONSULTANT
Golder Associates

YYYY-MM-DD	2017-12-12
DESIGNED	CCS
PREPARED	KAC
REVIEWED	RFS
APPROVED	TJS

PROJECT
2017 ANNUAL INSPECTION REPORT

TITLE
DRAINS POND SYSTEM
PHOTOGRAPH LOCATIONS

PROJECT NO.	REV.	FIGURE
1772255	A	1

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

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Path: \\Denver.golder.gds\projects\17-JOBS\1772255 GRE CCS\CCR Rules\Annual Inspections\Drains Pond\ | File Name: DP_AnnualInspection_2017.dwg

Drains Pond System

Photograph 1 (South toe)
South toe, no seeps or burrows noted (P1040189.JPG)

Photograph 2 (South berm downstream slope)
Water ponded at low point along the south berm dowstream slope (P1040193.JPG)

Drains Pond System

Photograph 3 (Center cell berm upstream slope)
Center cell riprap and sediment accumulation from plant drains (P1040195.JPG)

Photograph 4 (West cell berm upstream slope)
West cell berm upstream slope (P1040196.JPG)

Drains Pond System

Photograph 5 (West cell berm upstream slope)
Operations within west cell (P1040205.JPG)

Photograph 6 (West cell berm upstream slope)
CCR discharge pipes (P1040209.JPG)

Drains Pond System

Photograph 7 (West berm crest)
West berm crest haul road (P1040214.JPG)

Photograph 8 (North surface water channel)
Culvert and channel, limited vegetation due to recent reseeding (P1040218.JPG)

Drains Pond System

Photograph 9 (North berm crest)
North perimeter berm crest haul road. (P1040219.JPG)

Photograph 10 (West cell berm crest)
Center cell and west cell intercell-berm crest and gravel road (P1040222.JPG)

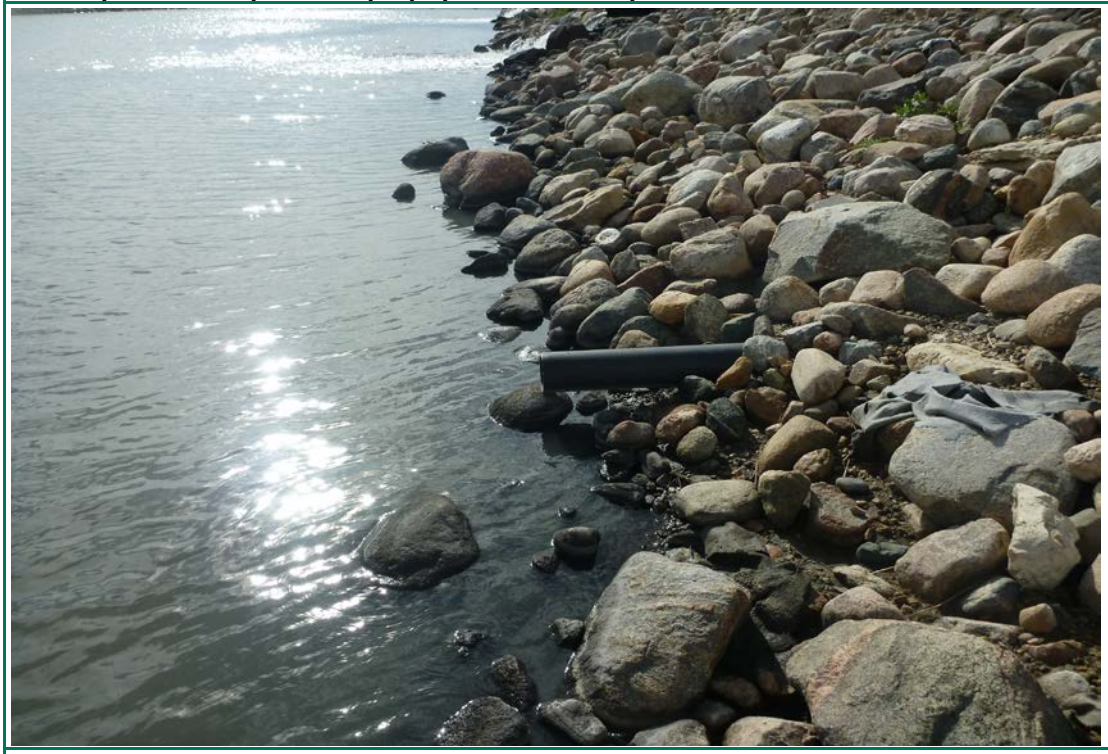
Drains Pond System

Photograph 11 (West cell/center cell intercell berm)
West cell/center cell intercell berm (minor erosion) (P1040223.JPG)

Photograph 12 (Center cell berm upstream slope)
Center cell gravel road, some minor erosion into the riprap (P1040229.JPG)

Drains Pond System

Photograph 13 (West cell berm upstream slope)
Berm upstream slope with riprap (P1040230.JPG)



Photograph 14 (Center cell berm upstream slope)
Passive drainage sump outlet pipe approximately 6 inches above water level (P1040231.JPG)

Drains Pond System

Photograph 15 (Center cell berm upstream slope)
North decant outlet between the west cell and center cell (P1040232.JPG)

Photograph 16 (West cell)
Decant pipe inlet from west cell to center cell (P1040233.JPG)

Drains Pond System

Photograph 17 (Center cell berm upstream slope)
Erosion of intercell gravel road between west cell and center cell (P1040235.JPG)

Photograph 18 (East cell berm upstream slope)
East cell berm upstream slope fly ash protective cover (P1040238.JPG)

Drains Pond System

Photograph 19 (East cell berm upstream slope)
Culvert outlet from ash pipelines ditch to the east cell (P1040239.JPG)

Photograph 20 (East cell berm crest)
South perimeter berm crest gravel road (P1040242.JPG)

Drains Pond System

Photograph 21 (East cell berm upstream slope)
Oversteepened fly ash protective cover on the south upstream slope of the east cell and exposed geotextile (P1040243.JPG)

Photograph 22 (East cell berm crest)
East perimeter berm crest gravel road, minor vegetation growing on berm upstream slope (P1040245.JPG)

Drains Pond System

Photograph 23 (East cell berm downstream slope)
East cell berm downstream slope well-vegetated, no woody vegetation (P1040246.JPG)

Photograph 24 (East cell berm upstream slope)
Berm upstream fly ash slope on north side of east cell (P1040250.JPG)

Drains Pond System

Photograph 25 (North berm downstream slope)
East cell north berm downstream slope erosion rills (6-12 inches deep) (P1040253.JPG)

Photograph 26 (North berm downstream slope)
North center cell and west cell berm downstream slope (P1040254.JPG)

Drains Pond System

Photograph 27 (North berm downstream slope)
Silt fence trench to be filled in (P1040255.JPG)

Photograph 28 (North surface water channel inlet to Center Cell)
Articulated Concrete Block (ACB) armoring (P1040257.JPG)

Drains Pond System

Photograph 29 (Center cell berm upstream slope)
Center cell berm upstream slope riprap (P1040258.JPG)

Photograph 30 (Center cell berm upstream slope)
East side of center cell berm upstream slope riprap (P1040260.JPG)