Proactive by Design

GEOTECHNICAL
ENVIRONMENTAL
ECOLOGICAL
WATER
CONSTRUCTION MANAGEMENT

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October 17, 2016
File: 21.0056797.00

Mr. Kevin Schroeder
Kevin.schroeder@nrgenergy.com
Huntley Power LLC
Tonawanda, NY 14150

Re: Hydrologic and Hydraulic Capacity Requirements for CCR Surface Impoundments
Huntley Generating Station
Tonawanda, New York

Dear Mr. Schroeder:

GZA GeoEnvironmental of New York (GZA) presents this Run-On and Run-Off Control System Plan to Huntley Power LLC (Huntley) for the existing coal combustion residuals (CCR) surface impoundment (identified as the South settling pond) located at the Huntley facility in Tonawanda New York (Site). This plan is required by the United States Environmental Protection Agency's (USEPAs) Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities; Final Rule, as presented in the Federal Register Volume 80 No 74 dated April 17, 2015. In accordance with the CCR Rule (40 CFR §257.82(c)), owners/operators of CCR units must prepare an initial inflow design flood control system plan for the CCR unit to document how the inflow design flood control system has been designed and constructed to meet the specific requirements outlined in the CCR Rule and supported by engineering calculations.

In accordance with §257.82, the owner or operator and an existing CCR surface impoundment must design, construct, operate and maintain an inflow design flood control system as follows:

- The inflow design flood control system must adequately manage the flow into the CCR unit during and following the peak discharge of the inflow design flood. As this surface impoundment has been identified as a "low hazard potential", the specified inflow design flood is the 100-year flood.

- The inflow design flood control system must adequately manage flow from the CCR unit to collect and control the peak discharge resulting from the inflow design flood, which for this impoundment is the 100-year flood.

Site Background

The Huntley CCR surface impoundment is identified as the South Settling Pond that was used for discharge of plant-generated process water including CCR sluice water and non-CCR water collected from sump pumps, non-contact cooling water, storm water and other various sources. As of February 29, 2016, the facility boilers were removed from service and the last of the CCR sluice water was discharged into the South Settling Pond by late March 2016

although plant-associated non-CCR water continues to be discharged. As a result, the flows into the pond have been reduced from about 6,800 gallons per minute (gpm) to about 1,500 gpm after the CCR sluice water was eliminated. The outfall for the South Pond is an approximate 92-inch by 65-inch oval pipe identified as Outfall 008 and is regulated under the New York State Department of Environmental Conservation (NYSDEC) State Pollutant Discharge Elimination System (SPDES) permit #9-1464-00130/00003. The limits of the Huntley south settling pond included in this run-on & run-off control plan are shown on the attached Figures.

Inputs for South Ponds

This analysis uses the same HEC-HMS hydrologic analysis model previously developed for "Hydrologic & Hydraulic Analysis, North Ponds & South Ponds, NRG Huntley Station, Tonawanda, New York" dated 2012, with some minor changes due to the plant boilers being removed from service. The HMS model input parameters are provided below.

As shown on Figure 2 the South Ponds consist of three basins- the North and South EQ Basins and the South Ash Settling Basin. The North and South EQ Basins receive a maximum process inflow of about 500 gpm (1.11 cfs) from the plant and share a 12-in diameter outflow pipe to South Ash Settling Basin. Because the EQ basins share a single outflow pipe they were modeled by GZA as a single reservoir storage element in HEC-HMS. The water levels in the EQ basins are also controlled by an outflow pump. Pump specifics and operational rules were not available therefore the outflow pump was not included in the analysis. All discharge to the settling basin was assumed to be conveyed by gravity based on the hydraulics of the 12-inch steel outlet pipe. Previously, the South Ash Settling Basin received a maximum process inflow of 6,800 gpm (15.15 cfs) at the north end when the plants boilers were operation. However, since the plants have been removed from service on February 29, 2016, the inflow rate was measured to have been reduced to about +/-1,500 gpm (3.34 cfs). The South Ash Settling Pond discharges to the Niagara River through a large 92-in by 65-in steel pipe (identified as SPDES Outfall 008) arch located at the extreme southerly corner of the pond. GZA's modeling effort included a sensitivity analysis to evaluate the impact of varying initial water levels in the equalization ponds.

Key elevations and dimensions are as follows:

	Dimension or Elevation (ft, IGLD 1955)
North & South EQ Basins	
Crest	580.3
In Invert of 12''Ø Outflow Pipe to South Settling Basin	579.3
Out Invert of 12''Ø Outflow Pipe to South Settling Basin	570±
Length of 12''Ø Outflow Pipe to South Settling Basin	120±
South Ash Settling Basin	
Crest	580.3
In Invert of 92"x65" Outflow Pipe to Niagara River	568.94
Out Invert of 92"x65" Outflow Pipe to Niagara River	568.04
Length of 92"x65" Outflow Pipe to Niagara River	55.0±

Key input parameters for the watershed areas in the HEC-HMS model are summarized in **Table C-1** below:

Table C-1: HEC-HMS Watershed Input – South Ponds

HEC-HMS Model	Subbasin	Drainage Area		Runoff Potential (SCS Curve Number)*	Watershed Lag Time (min)
		(sq mi)	(sq ft)		
South Ponds	North and South EQ Basin	0.00475	132,400	99	6
	South Ash Settling Basin	0.012329	343,700	95	6

*Note: Composite curve numbers with CN of 99 for water and 89 for land.

Tables C-2 and **C-3** present the elevation-area and elevation-storage relationships that GZA developed for the subbasins for the South Ponds.

Table C-2: Reservoir Elevation-Area Function for North & South EQ Basins (Combined)

Elevation (ft, IGLD 1955)	Area		Storage (acre-ft)
	(sq ft)	(ac)	
572	66,320	1.522	0
580.3	132,400	3.039	18.6

Table C-3: Reservoir Elevation-Area Function for South Ash Settling Basin

Elevation (ft, IGLD 1955)	Area		Storage (acre-ft)
	(sq ft)	(ac)	
563	114,000	2.617	0
575	200,000	4.951	42.7

Initial Water Surface

The initial water surface elevation for the North and South EQ Basins are assumed to be at the elevation of the overflow structure, El.579.3. The EQ Basins are typically maintained at lower elevations by utilizing the outflow pump. A sensitivity study was performed to evaluate the influence of varying the initial water surface elevation.

The initial water surface elevation in the South Ash Settling Pond is assumed to be coincident with the 500-year water surface in the Niagara River, El. 570.65.

Tailwater Conditions

Tailwater for the pipe from the EQ Basins to the South Ash Settling Pond was set at El.571.5 for the runs for South Ponds. The tailwater for South Ash Settling Basin was constantly set at El.570.65, the 500-year flood in Niagara River, which is a conservative assumption, in GZA's opinion.

In summary, two key changes in the input parameters to the existing HEC-HMS model are:

1. The analysis used 100-year, 24-hour precipitation based on NOAA's Atlas 14. The total depth is 5.03 inches for the 24-hour duration. The hyetograph was constructed using the SCS Type 3 distribution, with a peak intensity occurring around Hour 12.

2. A plant process inflow of 1,500 gpm into the South Ash Settling Pond, was used. Note that 500 gpm of inflow into the equalization pond (North and South equalization pond) remains unchanged.

Results for South Ponds

The HEC-HMS model results indicate that the equalization ponds and the ash settling pond will not be overtopped by a 100-year, 24-hour rainfall, even if the initial water level is high in the equalization ponds. There will be more than 3 feet of freeboard for the settling pond under all three modeled conditions.

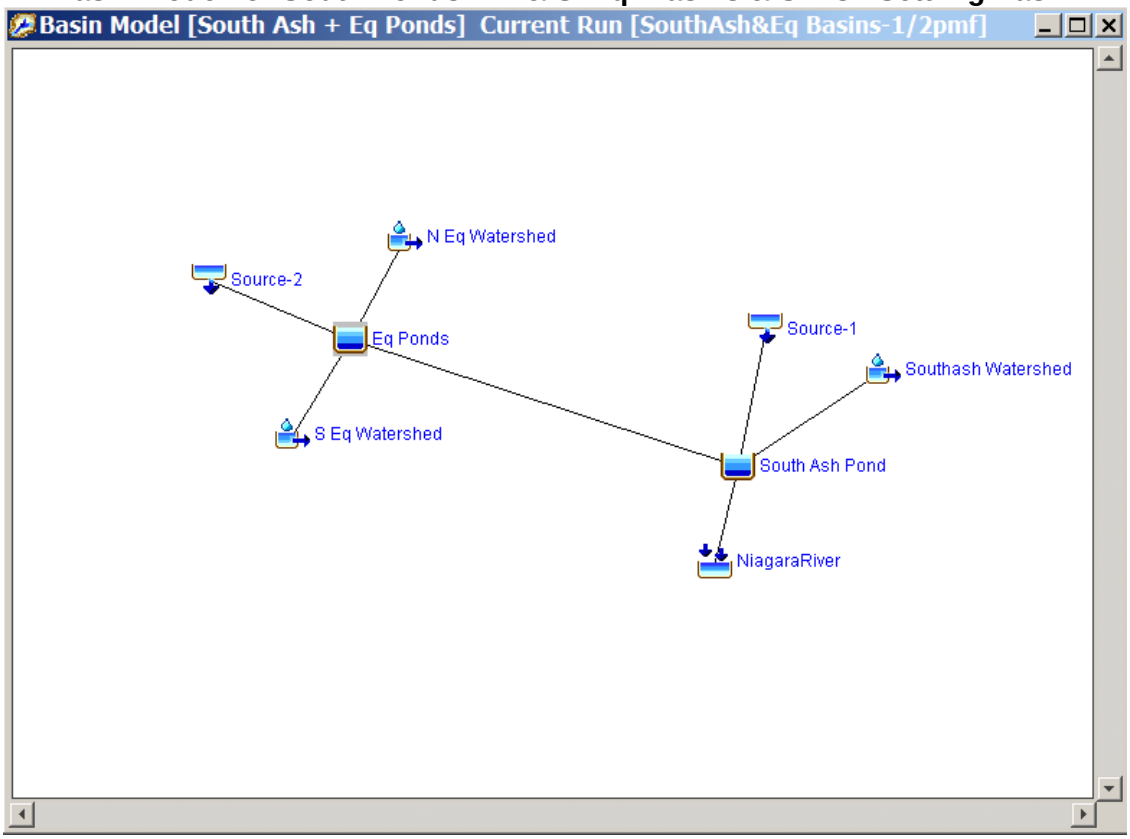
Table xx: HEC-HMS Results for South Ponds (100-year, 24-hour Rainfall)

Case	Pond	Initial WSEL (ft)	Process Inflow (gpm)	Watershed Runoff (in)	Peak Inflow (cfs)	Peak Outflow (cfs)	Max WSEL (ft)	Freeboard[1] (ft)
1	N. EQ	579.3	500	4.9	7.3	1.5	580.1	**0.2**
	S. EQ			4.9				
	S. Set.	570.65	1,500	4.4	20.3	19.5	570.7	**4.3**
2	N. EQ	578	500	4.9	7.3	1.0	580.0	**0.3**
	S. EQ			4.9				
	S. Set.	570.65	1,500	4.4	19.1	18.5	570.7	**4.3**
3	N. EQ	577	500	4.9	7.3	0.1	579.5	**0.8**
	S. EQ			4.9				
	S. Set.	570.65	1,500	4.4	19.1	18.5	570.7	**4.3**

Notes for Table C-4:

1. Various initial water levels at the equalization ponds were used as a sensitivity test.
2. Assumed top of berm at El.580.3 for North and South EQ Basins; assumed top of berm at El. 575.0 for South Ash Settling Basin.

Basin Model for South Ponds - N. & S. Eq. Basins & S. Ash Settling Basin



PROFESSIONAL ENGINEER CERTIFICATION56798.

The undersigned registered professional engineer is familiar with the requirements of §257.82(c) *Inflow design flood control system plan.* The undersigned registered professional engineer attests that this CCR Inflow design flood control system plan has been prepared in accordance with good engineering practice, including consideration of applicable state regulatory requirements and meets the requirements of §257.82(c), and that this plan is adequate for the NRG - Huntley Power. This certification was prepared as required by §257.81(c)(5).

Name of Professional Engineer: Daniel J. Troy, P.E.
Company: GZA GEOENVIRONMENTAL OF NEW YORK

Signature: _____
Date: October 17, 2016
PE Registration State: New York
PE Registration Number: 081139-1

Professional Engineer Seal:

We trust this information satisfies your needs for this project.

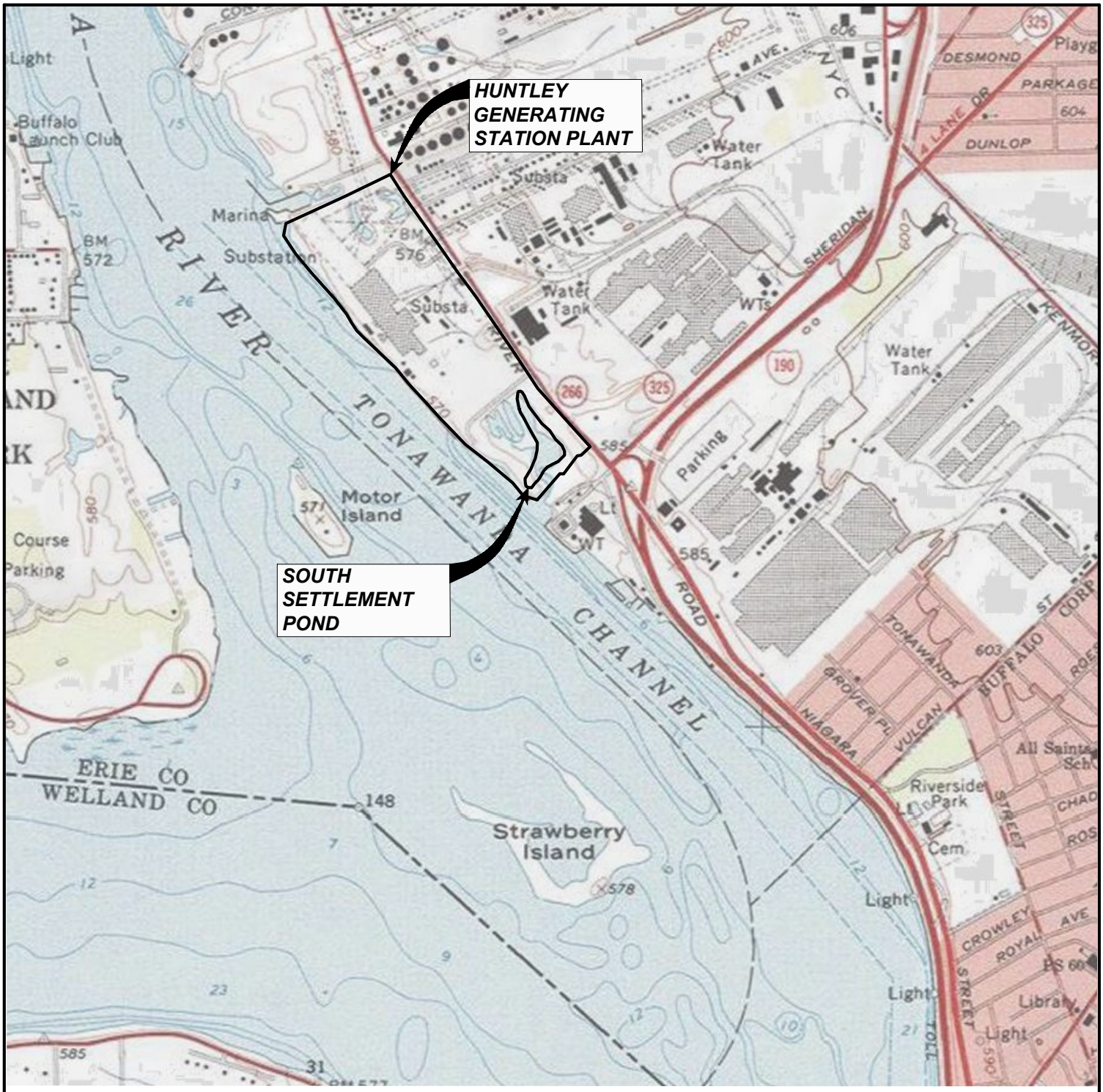
Sincerely,

GZA GEOENVIRONMENTAL OF NEW YORK

Daniel J. Troy, P.E.
Senior Project Manager

Bart A. Klettke, P.E.
Principal

Attachments: Figure 1 – Site Location Plan
Figure 2 – South Settling Pond Plan



NOTE:
BASE MAP ADAPTED FROM USA TOPO MAPS USING ArcGIS AUTOCAD PLUGIN

0 750 1500 3000
APPROXIMATE SCALE IN FEET

NO.	ISSUE/DESCRIPTION	BY	DATE

PREPARED BY:
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SOUTH SETTLING POND
LOCUS PLAN

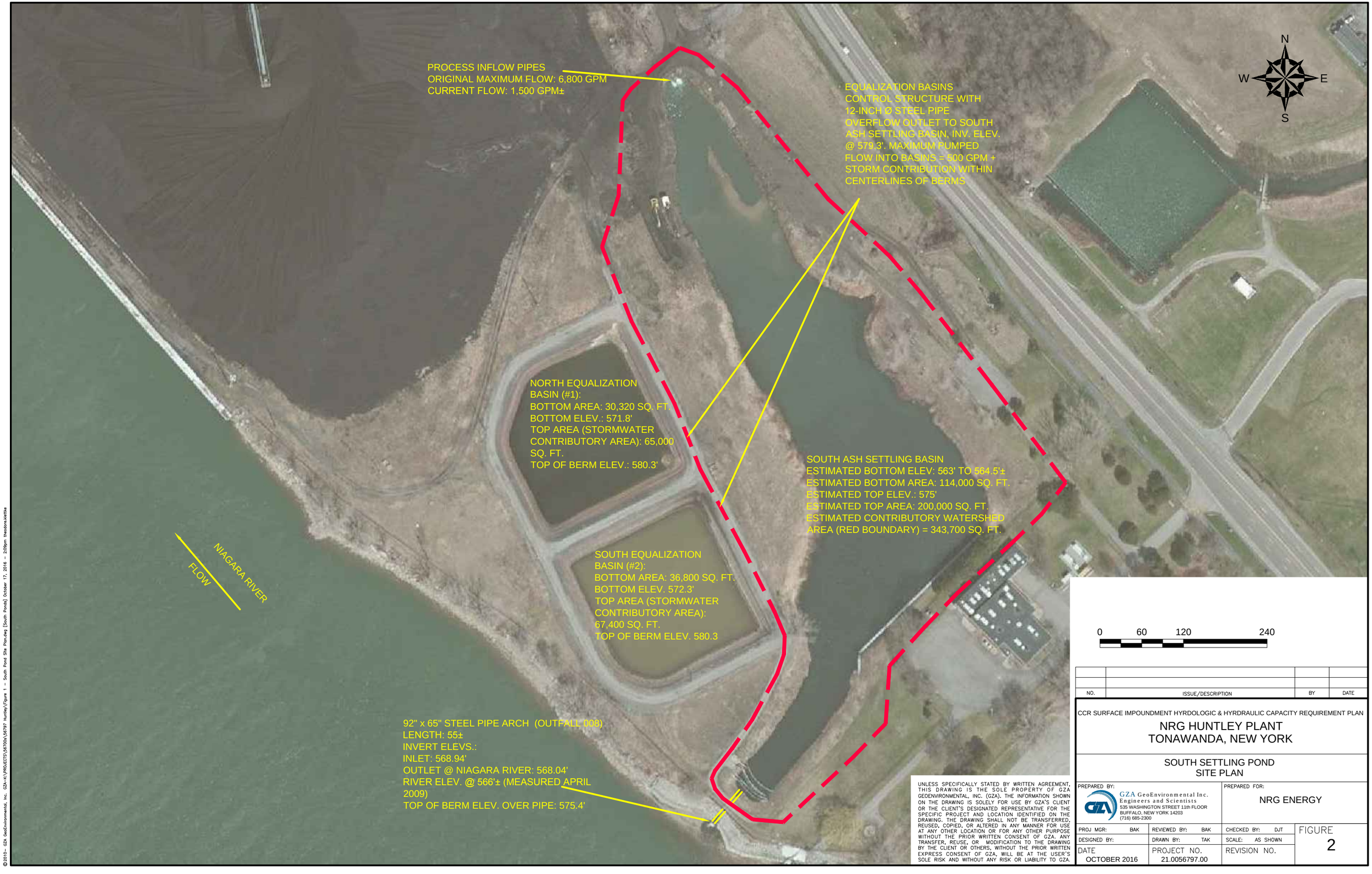
CCR SURFACE IMPOUNDMENT HYDROLOGIC & HYDRAULIC CAPACITY REQUIREMENT PLAN

NRG HUNTLEY PLANT
TONAWANDA, NEW YORK

PREPARED FOR:
NRG HUNTLEY POWER, LLC
3500 RIVER ROAD
TONAWANDA, NEW YORK

FIGURE
1

PROJ MGR:	DJT	REVIEWED BY:	BAK	CHECKED BY:	DJT	DATE	PROJECT NO.	REVISION NO.
DESIGNED BY:	DJT	DRAWN BY:	TAK	SCALE:	AS SHOWN	OCTOBER 2016	21.0056797.00	



0 60 120 240

NO.	ISSUE/DESCRIPTION	BY	DATE

CCR SURFACE IMPOUNDMENT HYRDOLOGIC & HYRDRAULIC CAPACITY REQUIREMENT PLAN

NRG HUNTLEY PLANT
TONAWANDA, NEW YORK

SOUTH SETTLING POND
SITE PLAN

PREPARED BY:
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PREPARED FOR:
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PROJ MGR: BAK	REVIEWED BY: BAK	CHECKED BY: DJT	FIGURE 2
DESIGNED BY:	DRAWN BY: TAK	SCALE: AS SHOWN	
DATE OCTOBER 2016	PROJECT NO. 21.0056797.00	REVISION NO.	