FLOOD MITIGATION PLAN
Binghamton-Johnson City Joint Sewage Treatment Plant
Vestal, New York

Flood Mitigation Costs
Table 4-1A: Flood Barrier Wall Construction - BJCJSTP

Date: May 21, 2012

Item	Subitem	Description	Quantity	Units	Unit Cost	Subitem Cost	Item Cost
1		Flood Barrier Wall					
	a	Steel Sheet Pile Flood Wall (Depth Varies)	1225	LF	$ 1,800	$ 2,205,000	
	b	Steel Sheet Pile Flood Wall, Braced (Depth Varies)	1275	LS	$ 2,200	$ 2,805,000	
	c	Site Work	1	LS	$ 50,000	$ 50,000	
	d					$ -	
		Item 1 Subtotal					$ 5,060,000
2		Site Drains and Pumping System					
	a	Collection Piping, 8"	2000	LF	$ 125	$ 250,000	
	b	Pumping Stations	2	EA	$ 100,000	$ 200,000	
	c	Discharge Piping, 6"	200	LF	$ 100	$ 20,000	
	d	Site Work	1	LS	$ 50,000	$ 50,000	
		Item 2 Subtotal					$ 520,000
3		Flood Gates at Driveway Entrances					
	a	Sliding Flood Gates	2	EA	$ 50,000	$ 100,000	
	b	Structural Work	1	LS	$ 25,000	$ 25,000	
	c	Site Work	1	LS	$ 10,000	$ 10,000	
	d					$ -	
		Item 3 Subtotal					$ 135,000
4							
	a					$ -	
	b					$ -	
	c					$ -	
	d					$ -	
		Item 4 Subtotal					$ -

Direct Costs Subtotal	$ 5,715,000
Contingency (+30%)	$ 1,715,000
Total Direct Costs	$ 7,430,000
Mobilization (+10%)	$ 743,000
Construction Costs Subtotal	$ 8,173,000
Contractor's Overhead and Profit (+20%)	$ 1,635,000
TOTAL CONSTRUCTION COSTS (May 2012 dollars)	$ 9,808,000
Engineering, Permitting, Construction Management, Project Administration, Legal Fees (+25%)	$ 2,452,000
TOTAL PROJECT COSTS (May 2012 dollars)	$ 12,260,000

Assumptions
1. Direct and Construction Costs rounded to the nearest $1000.

ENR Construction Cost Factors
ENR CCI - May 2012 9290

FLOOD MITIGATION PLAN
Binghamton-Johnson City Joint Sewage Treatment Plant
Vestal, New York

Flood Mitigation Costs
Table 4-1B: Flood Barrier Wall Construction - Terminal Pumping Station

Date: May 21, 2012

Item	Subitem	Description	Quantity	Units	Unit Cost	Subitem Cost	Item Cost
1		Flood Barrier Wall					
	a	Cast in Place Concrete Retaining Wall	525	LF	$ 2,200	$ 1,155,000	
	b	Excavation and Backfill	525	LF	$ 115	$ 60,375	
	c	Site Work	1	LS	$ 50,000	$ 50,000	
	d					$ -	
		Item 1 Subtotal					$ 1,265,375
2		Site Drains and Pumping System					
	a	Collection Piping, 8"	100	LF	$ 125	$ 12,500	
	b	Pumping Stations	1	EA	$ 50,000	$ 50,000	
	c	Discharge Piping, 6"	100	LF	$ 100	$ 10,000	
	d	Site Work	1	LS	$ 10,000	$ 10,000	
		Item 2 Subtotal					$ 82,500
3		Flood Gates at Driveway Entrances					
	a	Sliding Flood Gates	2	EA	$ 250,000	$ 500,000	
	b	Structural Work	1	LS	$ 25,000	$ 25,000	
	c	Site Work	1	LS	$ 5,000	$ 5,000	
	d	Electrical Work	1	LS	$ 50,000	$ 50,000	
		Item 3 Subtotal					$ 580,000
4							
	a					$ -	
	b					$ -	
	c					$ -	
	d					$ -	
		Item 4 Subtotal					$ -
		Direct Costs Subtotal					$ 1,928,000
		Contingency (+30%)					$ 578,000
		Total Direct Costs					$ 2,506,000
		Mobilization (+10%)					$ 251,000
		Construction Costs Subtotal					$ 2,757,000
		Contractor's Overhead and Profit (+20%)					$ 551,000
		TOTAL CONSTRUCTION COSTS (May 2012 dollars)					$ 3,308,000
		Engineering, Permitting, Construction Management, Project Administration, Legal Fees (+25%)					$ 827,000
		TOTAL PROJECT COSTS (May 2012 dollars)					$ 4,135,000

Assumptions
1. Direct and Construction Costs rounded to the nearest $1000.

ENR Construction Cost Factors
ENR CCI - May 2012 9290

FLOOD MITIGATION PLAN
Binghamton-Johnson City Joint Sewage Treatment Plant
Vestal, New York

Flood Mitigation Plan
Table 4-2A - Waterproof Existing Structures - Summary of Existing Openings in Structures Above Grade Below Design Flood Elevations

			Flood Gate Installation										Structural				Sump Pumps
		Item	Flood Gate, Std Ped Door	Flood Gate, Std Ped Door	Flood Gate, Std Ped Door	Flood Gate, Dbl Ped Door	Flood Gate, Dbl Ped Door	Flood Gate, Dbl Ped Door	Flood Gate, Grg Door	Flood Gate, Grg Door	Flood Gate, Grg Door	Floor/Roof Hatch	Seal Wall Penetration, Small	Seal Wall Penetration, Medium	Seal Wall Penetration, Large	Other Structural	No. of Exist. Sumps
		Unit	0' - 2' H, Ea.	2' - 4.5' H, Ea.	4.5' - 7' H, Ea.	0' - 2' H, Ea.	2' - 4.5' H, Ea.	4.5' - 7' H, Ea.	0' - 2' H, Ea.	2' - 4.5' H, Ea.	4.5' - 7' H, Ea.		Ea.	Ea.	Ea.		Ea.
Facility Name	Flood Protection Height (500-Year Flood)																
C Filter Complex	Height of Flood Protection (ft)			1			1									Louver: 5' W x 3' H	0
Backwash Pumping Station / Fine Screenings Bldg	0.0						2										2
N Filter Complex	1.0																2
Secondary Influent Pumping Station	0.0			2						8' W							1
DN Filter Complex	0.0																1
Blower Building (New)	N/A				2						2 @ 8' W					Louver: 6' W x 12' H (only 6" of louver below flood)	
Head House	N/A																1
Sludge Loading Bay and Maintenance Garage (@ HH)	2.5			2						2 @ 10' W, 14' W						Metal Siding on Sludge Loading Bay	
Grit Building	2			2						12' W							
Grit Washing House 1	0																1
Grit Washing House 2	N/A																1
Blower Building (Old)	N/A		1			3 x 14' W			14' W					4 @ 12" dia pipes in trench for blowers.	4 @ 6' H x 5' W openings in trench for blower air; std ped door in trench for access from basement.	75' L x 4' W grated opening at grade to trench for blower air; 30' L x 4' W grated opening at grade adjacent to former air filter rooms.	2
Primary Sludge Pumping Station 1	N/A			1								5' x 5'					1
Primary Sludge Pumping Station 2	N/A				3							6.5' x 6.5'	4				2
Scrubber Building	N/A				2						10' W						
East Scrubber Building	0.5			3						13' W			6				
Chlorination Building	3.5				1			1					9				
Sludge Thickener Pumping Station 1	3.6			1								7.5' x 5.5'	3			Odor Control Blower slab about EL 840	1
Sludge Thickener Pumping Station 2	0.8			1								7.5' x 7.5'	6			Odor Control Blower slab about EL 840	1
Sludge Control Building 1	2.3						1									Louvers: 2@ 1' W x 2' H	1
Sludge Control Building 2	0.85						2						3				1
Compost Facility	N/A			5			3			10' W, 2 @ 14' W			1	1		Louvers: 2@ 16" x 32"; 4' W x 3' H opening for old conveyor; 32" x 48" opening on N side; storage shed located at grade	
Scum Pumping Station	1																
Terminal Pumping Station	0				2			1			1						

FLOOD MITIGATION PLAN
Binghamton-Johnson City Joint Sewage Treatment Plant
Vestal, New York

Flood Mitigation Costs
Table 4-5A: Sump Pump Improvements - BJCJSTP

Date: May 21, 2012

Item	Subitem	Description	Quantity	Units	Unit Cost	Subitem Cost	Item Cost
1		Sump Improvements					
	a	High Capacity Sump Pumps	18	EA	$ 25,000	$ 450,000	
	b	Replace existing sump pumps	18	EA	$ 10,000	$ 180,000	
	c	Piping (50 LF per Pump)	900	LF	$ 85	$ 76,500	
	d	Check Valve, Shutoff Valve, Appurtenances	18	EA	$ 2,000	$ 36,000	
	e	Installation and Testing	18	EA	$ 20,000	$ 360,000	
		Item 1 Subtotal					$ 1,102,500
2		Controls					
	a	Controls	18	EA	$ 10,000	$ 180,000	
	b	Sump Flood Alarm Panels	18	EA	$ 10,000	$ 180,000	
	c					$ -	
	d					$ -	
		Item 2 Subtotal					$ 360,000
3		Electrical					
	a	Electrical Work for Sump Pumps	18	EA	$ 10,000	$ 180,000	
	b	VFDs for Sump Pumps	18	EA	$ 10,000	$ 180,000	
	c					$ -	
	d					$ -	
		Item 3 Subtotal					$ 360,000
4		Electrical Generators					
	a	Emergency Generators, Safety Equip Only	1	LS	$ 1,400,000	$ 1,400,000	
	b					$ -	
	c					$ -	
	d					$ -	
		Item 4 Subtotal					$ 1,400,000

Direct Costs Subtotal	$ 3,223,000
Contingency (+30%)	$ 967,000
Total Direct Costs	$ 4,190,000
Mobilization (+10%)	$ 419,000
Construction Costs Subtotal	$ 4,609,000
Contractor's Overhead and Profit (+20%)	$ 922,000
TOTAL CONSTRUCTION COSTS (May 2012 dollars)	$ 5,531,000
Engineering, Permitting, Construction Management, Project Administration, Legal Fees (+25%)	$ 1,383,000
TOTAL PROJECT COSTS (May 2012 dollars)	$ 6,914,000

Assumptions
1. Direct and Construction Costs rounded to the nearest $1000.

ENR Construction Cost Factors
ENR CCI - May 2012 9290

FLOOD MITIGATION PLAN
Binghamton-Johnson City Joint Sewage Treatment Plant
Vestal, New York

Flood Mitigation Costs
Table 4-2B: Waterproof Existing Structures - BJCJSTP

Date: May 21, 2012

Item	Subitem	Description	Quantity	Units	Unit Cost	Subitem Cost	Item Cost
1		Stop Gates					
	a	Stop Gates, 0' - 2'	4	EA	$ 6,500	$ 26,000	
	b	Stop Gates, 2' - 4.5'	27	EA	$ 9,000	$ 243,000	
	c	Stop Gates, 4.5' - 7'	12	EA	$ 13,900	$ 166,600	
	d	Installation	43	EA	$ 5,000	$ 215,000	
		Item 1 Subtotal					$ 650,800
2		Stop Logs at Overhead Doors					
	a	Stop Logs, 0' - 2'	1	EA	$ 7,600	$ 7,600	
	b	Stop Logs, 2' - 4.5'	9	EA	$ 10,000	$ 90,000	
	c	Stop Logs, 4.5' - 7'	4	EA	$ 15,000	$ 60,000	
	d	Installation	14	EA	$ 4,000	$ 56,000	
		Item 2 Subtotal					$ 213,600
3		Protect At-Grade Roof Hatches					
	a	Structural Work	4	EA	$ 7,500	$ 30,000	
	b	Stop Gates, 2' - 4.5'	3	EA	$ 9,000	$ 27,000	
	c	Stop Gates, 4.5' - 7'	1	EA	$ 13,900	$ 13,900	
	d	Installation	4	EA	$ 5,000	$ 20,000	
		Item 2 Subtotal					$ 90,900
3		Structural Improvements - Stop Gates					
	a	Structural for Stop Gates, 0' - 2'	5	EA	$ 3,000	$ 15,000	
	b	Structural for Stop Gates, 2' - 4.5'	36	EA	$ 3,500	$ 126,000	
	c	Structural for Stop Gates, 4.5' - 7'	16	EA	$ 4,500	$ 72,000	
	d					$ -	
		Item 3 Subtotal					$ 213,000
4		Replace / Overlay Masonry					
	a	Replace/Overlay Masonry, 0' - 2'	320	LF	$ 200	$ 64,000	
	b	Replace/Overlay Masonry, 2' - 4.5'	1250	LF	$ 325	$ 406,250	
	c	Replace/Overlay Masonry, 4.5' - 7'	520	LF	$ 450	$ 234,000	
	d					$ -	
		Item 4 Subtotal					$ 704,250
5		Seal Penetrations					
	a	Seal Penetrations, Minor	32	EA	$ 500	$ 16,000	
	b	Seal Penetrations, Small	5	EA	$ 1,000	$ 5,000	
	c	Seal Penetrations, Medium	4	EA	$ 1,500	$ 6,000	
	d	Seal Penetrations, Large	1	LS	$ 50,000	$ 50,000	
	e	Seal Openings / Cracks Below Grade	1	LS	$ 25,000	$ 25,000	
		Item 5 Subtotal					$ 102,000

Direct Costs Subtotal	$ 1,975,000
Contingency (+30%)	$ 593,000
Total Direct Costs	$ 2,568,000
Mobilization (+10%)	$ 257,000
Construction Costs Subtotal	$ 2,825,000
Contractor's Overhead and Profit (+20%)	$ 565,000
TOTAL CONSTRUCTION COSTS (May 2012 dollars)	$ 3,390,000
Engineering, Permitting, Construction Management, Project Administration, Legal Fees (+25%)	$ 848,000
TOTAL PROJECT COSTS (May 2012 dollars)	$ 4,238,000

Assumptions
1. Direct and Construction Costs rounded to the nearest $1000.

ENR Construction Cost Factors
ENR CCI - May 2012

FLOOD MITIGATION PLAN
Binghamton-Johnson City Joint Sewage Treatment Plant
Vestal, New York

Flood Mitigation Costs
Table 4-2C: Waterproof Existing Structures - Terminal Pumping Station

Date: May 21, 2012

Item	Subitem	Description	Quantity	Units	Unit Cost	Subitem Cost	Item Cost
1		Stop Gates					
	a	Stop Gates, 0' - 2'	0	EA	$ 6,500	$ -	
	b	Stop Gates, 2' - 4.5'	0	EA	$ 9,000	$ -	
	c	Stop Gates, 4.5' - 7'	2	EA	$ 13,900	$ 27,800	
	d	Installation	2	EA	$ 5,000	$ 10,000	
		Item 1 Subtotal					$ 37,800
2		Stop Logs at Double Doors					
	a	Stop Logs, 0' - 2'	0	EA	$ 7,500	$ -	
	b	Stop Logs, 2' - 4.5'	0	EA	$ 10,000	$ -	
	c	Stop Logs, 4.5' - 7'	1	EA	$ 15,000	$ 15,000	
	d	Installation	1	EA	$ 4,000	$ 4,000	
		Item 2 Subtotal					$ 19,000
3							
	a					$ -	
	b					$ -	
	c					$ -	
	d					$ -	
		Item 2 Subtotal					$ -
3		Structural Improvements - Stop Gates					
	a	Structural for Stop Gates, 0' - 2'	0	EA	$ 3,000	$ -	
	b	Structural for Stop Gates, 2' - 4.5'	0	EA	$ 3,500	$ -	
	c	Structural for Stop Gates, 4.5' - 7'	3	EA	$ 4,500	$ 13,500	
	d					$ -	
		Item 3 Subtotal					$ 13,500
4		Replace / Overlay Masonry					
	a	Replace/Overlay Masonry, 0' - 2'	0	LF	$ 200	$ -	
	b	Replace/Overlay Masonry, 2' - 4.5'	0	LF	$ 325	$ -	
	c	Replace/Overlay Masonry, 4.5' - 7'	275	LF	$ 450	$ 123,750	
	d					$ -	
		Item 4 Subtotal					$ 123,750
5		Seal Penetrations					
	a	Seal Penetrations, Minor	2	EA	$ 500	$ 1,000	
	b	Seal Penetrations, Small	2	EA	$ 1,000	$ 2,000	
	c	Seal Penetrations, Medium	1	EA	$ 1,500	$ 1,500	
	d	Seal Penetrations, Large	1	LS	$ 10,000	$ 10,000	
	e	Seal Openings / Cracks Below Grade	1	LS	$ 5,000	$ 5,000	
		Item 5 Subtotal					$ 19,500
		Direct Costs Subtotal					$ 214,000
		Contingency (+30%)					$ 64,000
		Total Direct Costs					$ 278,000
		Mobilization (+10%)					$ 28,000
		Construction Costs Subtotal					$ 306,000
		Contractor's Overhead and Profit (+20%)					$ 61,000
		TOTAL CONSTRUCTION COSTS (May 2012 dollars)					$ 367,000
		Engineering, Permitting, Construction Management, Project Administration, Legal Fees (+25%)					$ 92,000
		TOTAL PROJECT COSTS (May 2012 dollars)					$ 459,000

Assumptions
1. Direct and Construction Costs rounded to the nearest $1000.

ENR Construction Cost Factors
ENR CCI - May 2012 9290

FLOOD MITIGATION PLAN
Binghamton-Johnson City Joint Sewage Treatment Plant
Vestal, New York

Flood Mitigation Costs
Table 4-6C: Emergency Generators - Low Voltage (480V) Generation, Full Plant Backup

Date: May 21, 2012

Item	Subitem	Description	Quantity	Units	Unit Cost	Subitem Cost	Item Cost
1		Electrical Generators					
	a	500 kW Generators	2	EA	$ 187,000	$ 374,000	
	b					$ -	
	c					$ -	
	d					$ -	
		Item 1 Subtotal					$ 374,000
2		Additional Equipment					
	a	Emergency Distribution Switchboard	2	EA	$ 30,000	$ 60,000	
	b	Emergency Panelboard	10	EA	$ 6,000	$ 60,000	
	c	100A ATS	10	EA	$ 7,000	$ 70,000	
	d					$ -	
	e					$ -	
	f					$ -	
		Item 2 Subtotal					$ 190,000
3		Distribution System					
	a	Cable	1	LS	$ 122,000	$ 122,000	
	b	Terminations	1	LS	$ 28,000	$ 28,000	
	c	Testing	1	LS	$ 4,100	$ 4,100	
	d	Conduit	1	LS	$ 102,500	$ 102,500	
	e					$ -	
	f					$ -	
	g					$ -	
		Item 3 Subtotal					$ 256,600
4							
	a					$ -	
	b					$ -	
	c					$ -	
	d					$ -	
		Item 4 Subtotal					$ -
5		Site Work					
	a	Site Work	1	LS	$ 30,000	$ 30,000	
	b					$ -	
	c					$ -	
	d					$ -	
		Item 4 Subtotal					$ 30,000
		Direct Costs Subtotal					$ 851,000
		Contingency (+30%)					$ 255,000
		Total Direct Costs					$ 1,106,000
		Mobilization (+10%)					$ 111,000
		Construction Costs Subtotal					$ 1,217,000
		Contractor's Overhead and Profit (+20%)					$ 243,000
		TOTAL CONSTRUCTION COSTS (May 2012 dollars)					$ 1,460,000
		Engineering, Permitting, Construction Management, Project Administration, Legal Fees (+25%)					$ 365,000
		TOTAL PROJECT COSTS (May 2012 dollars)					$ 1,825,000

Assumptions
1. Direct and Construction Costs rounded to the nearest $1000.

ENR Construction Cost Factors
ENR CCI - May 2012 9290

FLOOD MITIGATION PLAN
Binghamton-Johnson City Joint Sewage Treatment Plant
Vestal, New York

Flood Mitigation Costs
Table 4-4A: Install Submersible Pump Motors - BJCJSTP

Date: May 21, 2012

Item	SubItem	Description	Quantity	Units	Unit Cost	SubItem Cost	Item Cost
1		Head House					
	a	Submersible Pump Motors	1	LS	$ 87,000	$ 87,000	
	b	Installation	1	LS	$ 87,000	$ 87,000	
	c	Electrical Upgrade Contingency	1	LS	$ 30,000	$ 30,000	
	d					$ -	
		Item 1 Subtotal					$ 204,000
2		Grit Complex					
	a	Submersible Pump Motors	1	LS	$ 28,000	$ 28,000	
	b	Installation	1	LS	$ 28,000	$ 28,000	
	c	Electrical Upgrade Contingency	1	LS	$ 10,000	$ 10,000	
	d					$ -	
		Item 2 Subtotal					$ 66,000
3		Sludge Control Bldg					
	a	Submersible Pump Motors	1	LS	$ 145,000	$ 145,000	
	b	Installation	1	LS	$ 145,000	$ 145,000	
	c	Electrical Upgrade Contingency	1	LS	$ 50,000	$ 50,000	
	d					$ -	
		Item 3 Subtotal					$ 340,000
4		Sludge Thickener PS 1 and 2					
	a	Submersible Pump Motors	1	LS	$ 146,000	$ 146,000	
	b	Installation	1	LS	$ 146,000	$ 146,000	
	c	Electrical Upgrade Contingency	1	LS	$ 50,000	$ 50,000	
	d					$ -	
		Item 4 Subtotal					$ 342,000
5		C Filter Complex					
	a	Submersible Pump Motors and Actuators	1	LS	$ 696,000	$ 696,000	
	b	Installation	1	LS	$ 350,000	$ 350,000	
	c	Electrical Upgrade Contingency	1	LS	$ 100,000	$ 100,000	
	d					$ -	
		Item 5 Subtotal					$ 1,146,000
6		N Filter Complex					
	a	Submersible Pump Motors and Actuators	1	LS	$ 48,000	$ 48,000	
	b	Installation	1	LS	$ 48,000	$ 48,000	
	c	Electrical Upgrade Contingency	1	LS	$ 25,000	$ 25,000	
	d					$ -	
		Item 6 Subtotal					$ 121,000
7							
	a					$ -	
	b					$ -	
	c					$ -	
	d					$ -	
		Item 7 Subtotal					$ -

Direct Costs Subtotal	$	2,219,000
Contingency (+30%)	$	666,000
Total Direct Costs	$	2,885,000
Mobilization (+10%)	$	289,000
Construction Costs Subtotal	$	3,174,000
Contractor's Overhead and Profit (+20%)	$	635,000
TOTAL CONSTRUCTION COSTS (May 2012 dollars)	$	3,809,000
Engineering, Permitting, Construction Management, Project Administration, Legal Fees (+25%)	$	953,000
TOTAL PROJECT COSTS (May 2012 dollars)	$	4,762,000

Assumptions
1. Direct and Construction Costs rounded to the nearest $1000.

ENR Construction Cost Factors
ENR CCI - May 2012 9290

FLOOD MITIGATION PLAN
Binghamton-Johnson City Joint Sewage Treatment Plant
Vestal, New York

Flood Mitigation Costs
Table 4-5B: Sump Pump Improvements - Terminal Pumping Station

Date: May 21, 2012

Item	Subitem	Description	Quantity	Units	Unit Cost	Subitem Cost	Item Cost
1		Sump Improvements					
	a	High Capacity Sump Pumps	1	EA	$ 25,000	$ 25,000	
	b	Piping	100	LF	$ 85	$ 8,500	
	c	Check Valve, Shutoff Valve, Appurtenances	1	EA	$ 2,000	$ 2,000	
	d	Installation and Testing	1	EA	$ 15,000	$ 15,000	
		Item 1 Subtotal					$ 50,500
2		Controls					
	a	Controls	1	EA	$ 10,000	$ 10,000	
	b	Sump Flood Alarm Panels	1	EA	$ 10,000	$ 10,000	
	c					$ -	
	d					$ -	
		Item 2 Subtotal					$ 20,000
3		Electrical					
	a	Electrical Work for Sump Pumps	1	EA	$ 10,000	$ 10,000	
	b	VFDs	1	EA	$ 10,000	$ 10,000	
	c					$ -	
	d					$ -	
		Item 3 Subtotal					$ 20,000
4		Electrical Generators					
	a	Emergency Generators	1	LS	$ 500,000	$ 500,000	
	b					$ -	
	c					$ -	
	d					$ -	
		Item 4 Subtotal					$ 500,000

Direct Costs Subtotal	$	591,000
Contingency (+30%)	$	177,000
Total Direct Costs	$	768,000
Mobilization (+10%)	$	77,000
Construction Costs Subtotal	$	845,000
Contractor's Overhead and Profit (+20%)	$	169,000
TOTAL CONSTRUCTION COSTS (May 2012 dollars)	$	1,014,000
Engineering, Permitting, Construction Management, Project Administration, Legal Fees (+25%)	$	254,000
TOTAL PROJECT COSTS (May 2012 dollars)	$	1,268,000

Assumptions
1. Direct and Construction Costs rounded to the nearest $1000.

ENR Construction Cost Factors
ENR CCI - May 2012 9290

FLOOD MITIGATION PLAN
Binghamton-Johnson City Joint Sewage Treatment Plant
Vestal, New York

Flood Mitigation Costs
Table 4-6A: Emergency Generators - Medium Voltage (4800V) Generation, Full Plant Backup

Date: May 21, 2012

Item	Subitem	Description	Quantity	Units	Unit Cost	Subitem Cost	Item Cost
1		Electrical Generators					
	a	2 MW Generators	3	EA	$ 804,000	$ 2,412,000	
	b					$ -	
	c					$ -	
	d					$ -	
		Item 1 Subtotal					$ 2,412,000
2		Additional Equipment					
	a	Generator Paralleling Gear (MV)	1	LS	$ 410,000	$ 410,000	
	b	600A Fused Switch	2	EA	$ 40,000	$ 80,000	
	c	HVS Bus Modifications	1	LS	$ 101,000	$ 101,000	
	d	HVA Key interlocking Modifications	1	LS	$ 30,000	$ 30,000	
		Item 2 Subtotal					$ 621,000
3		Distribution System					
	a	5kV Cable	1	LS	$ 128,000	$ 128,000	
	b	5kV Terminations	1	LS	$ 33,000	$ 33,000	
	c	Testing	1	LS	$ 8,000	$ 8,000	
	d	4" RGS Conduit	1	LS	$ 83,000	$ 83,000	
		Item 3 Subtotal					$ 252,000
4		Fuel Storage					
	a	Storage Tanks	2	EA	$ 21,000	$ 42,000	
	b	Transfer Pumps	3	EA	$ 3,000	$ 9,000	
	c	Piping	1	LS	$ 75,000	$ 75,000	
	d	Valves	1	LS	$ 56,000	$ 55,000	
		Item 4 Subtotal					$ 182,000
5		Site Work					
	a	Site Work	1	LS	$ 75,000	$ 75,000	
	b					$ -	
	c					$ -	
	d					$ -	
		Item 4 Subtotal					$ 75,000
		Direct Costs Subtotal					$ 3,542,000
		Contingency (+30%)					$ 1,063,000
		Total Direct Costs					$ 4,605,000
		Mobilization (+10%)					$ 461,000
		Construction Costs Subtotal					$ 5,066,000
		Contractor's Overhead and Profit (+20%)					$ 1,013,000
		TOTAL CONSTRUCTION COSTS (May 2012 dollars)					$ 6,079,000
		Engineering, Permitting, Construction Management, Project Administration, Legal Fees (+25%)					$ 1,520,000
		TOTAL PROJECT COSTS (May 2012 dollars)					$ 7,599,000

Assumptions
1. Direct and Construction Costs rounded to the nearest $1000.

ENR Construction Cost Factors
ENR CCI - May 2012 9290

FLOOD MITIGATION PLAN
Binghamton-Johnson City Joint Sewage Treatment Plant
Vestal, New York

Flood Mitigation Costs
Table 4-6B: Emergency Generators - Low Voltage (480V) Generation, Full Plant Backup

Date: May 21, 2012

Item	Subitem	Description	Quantity	Units	Unit Cost	Subitem Cost	Item Cost
1		Electrical Generators					
	a	2 MW Generators	3	EA	$ 674,000	$ 2,022,000	
	b					$ -	
	c					$ -	
	d					$ -	
		Item 1 Subtotal					$ 2,022,000
2		Additional Equipment					
	a	Generator Paralleling Gear (LV)	1	LS	$ 268,000	$ 268,000	
	b	480V-4800V, 3600kVA Transformer	2	EA	$ 95,000	$ 190,000	
	c	Secondary MV Gear	1	LS	$ 160,000	$ 160,000	
	d	600A Fused Switch	2	EA	$ 40,000	$ 80,000	
	e	HVS Bus Modifications	1	LS	$ 101,000	$ 101,000	
	f	HVA Key Interlocking Modifications	1	LS	$ 30,000	$ 30,000	
		Item 2 Subtotal					$ 829,000
3		Distribution System					
	a	5kV Cable	1	LS	$ 224,000	$ 224,000	
	b	5kV Terminations	1	LS	$ 36,000	$ 36,000	
	c	Testing	1	LS	$ 8,700	$ 8,700	
	d	480V Cable	1	LS	$ 314,000	$ 314,000	
	e	480V Terminations	1	LS	$ 46,000	$ 46,000	
	f	Testing	1	LS	$ 3,000	$ 3,000	
	g	4" RGS Conduit	1	LS	$ 260,000	$ 260,000	
		Item 3 Subtotal					$ 891,700
4		Fuel Storage					
	a	Storage Tanks	2	EA	$ 21,000	$ 42,000	
	b	Transfer Pumps	3	EA	$ 3,000	$ 9,000	
	c	Piping	1	LS	$ 75,000	$ 75,000	
	d	Valves	1	LS	$ 56,000	$ 56,000	
		Item 4 Subtotal					$ 182,000
5		Site Work					
	a	Site Work	1	LS	$ 75,000	$ 75,000	
	b					$ -	
	c					$ -	
	d					$ -	
		Item 4 Subtotal					$ 75,000
		Direct Costs Subtotal					$ 4,000,000
		Contingency (+30%)					$ 1,200,000
		Total Direct Costs					$ 5,200,000
		Mobilization (+10%)					$ 520,000
		Construction Costs Subtotal					$ 5,720,000
		Contractor's Overhead and Profit (+20%)					$ 1,144,000
		TOTAL CONSTRUCTION COSTS (May 2012 dollars)					$ 6,864,000
		Engineering, Permitting, Construction Management, Project Administration, Legal Fees (+25%)					$ 1,716,000
		TOTAL PROJECT COSTS (May 2012 dollars)					$ 8,580,000

Assumptions
1. Direct and Construction Costs rounded to the nearest $1000.

ENR Construction Cost Factors
ENR CCI - May 2012

9290

FLOOD MITIGATION PLAN
Binghamton-Johnson City Joint Sewage Treatment Plant
Vestal, New York

Flood Mitigation Costs
Table 4-7: Sediment Removal from Fuller Hollow Creek Outlet

Date: May 21, 2012

Item	Subitem	Description	Quantity	Units	Unit Cost	Subitem Cost	Item Cost
1		Temporary Work					
	a	Dredging Mobilization	1	LS	$ 75,000	$ 75,000	
	b	Temporary Site Work	1	LS	$ 50,000	$ 50,000	
	c					$ -	
	d					$ -	
		Item 1 Subtotal					$ 125,000
2		Sediment Removal					
	a	Mechanical Dredging	100,000	CY	$ 15	$ 1,450,000	
	b	Hauling	100,000	CY	$ 7	$ 700,000	
	c	Disposal (assumes non-hazardous landfill disposal)	100,000	CY	$ 20	$ 2,000,000	
	d	Dewatering	100,000	CY	$ 3	$ 300,000	
		Item 2 Subtotal					$ 4,450,000
3							
	a					$ -	
	b					$ -	
	c					$ -	
	d					$ -	
		Item 3 Subtotal					$ -
4							
	a					$ -	
	b					$ -	
	c					$ -	
	d					$ -	
		Item 4 Subtotal					$ -

Direct Costs Subtotal	$	4,575,000
Contingency (+30%)	$	1,373,000
Total Direct Costs	$	5,948,000
Mobilization (+10%)	$	595,000
Construction Costs Subtotal	$	6,543,000
Contractor's Overhead and Profit (+20%)	$	1,309,000
TOTAL CONSTRUCTION COSTS (May 2012 dollars)	$	7,852,000
Engineering, Permitting, Construction Management, Project Administration, Legal Fees (+25%)	$	1,963,000
TOTAL PROJECT COSTS (May 2012 dollars)	$	9,815,000

Assumptions
1. Direct and Construction Costs rounded to the nearest $1000.

ENR Construction Cost Factors
ENR CCI - May 2012 9290

FLOOD MITIGATION PLAN
Binghamton-Johnson City Joint Sewage Treatment Plant
Vestal, New York

Flood Mitigation Costs
Table 4-6D: Emergency Generators - Terminal Pumping Station

Date: May 21, 2012

Item	Subitem	Description	Quantity	Units	Unit Cost	Subitem Cost	Item Cost
1		Electrical Generators					
	a	500 kW Generators	1	EA	$ 187,000	$ 187,000	
	b					$ -	
	c					$ -	
	d					$ -	
		Item 1 Subtotal					$ 187,000
2		Additional Equipment					
	a	Generator Switchgear	1	LS	$ 165,000	$ 165,000	
	b	Bus Modifications	1	LS	$ 35,000	$ 35,000	
	c	Fused Switch	1	EA	$ 40,000	$ 40,000	
	d					$ -	
	e					$ -	
	f					$ -	
		Item 2 Subtotal					$ 240,000
3		Distribution System					
	a	Cable	1	LS	$ 30,000	$ 30,000	
	b	Terminations	1	LS	$ 5,000	$ 5,000	
	c	Testing	1	LS	$ 1,500	$ 1,500	
	d	Conduit	1	LS	$ 15,000	$ 15,000	
	e					$ -	
	f					$ -	
	g					$ -	
		Item 3 Subtotal					$ 51,500
4							
	a					$ -	
	b					$ -	
	c					$ -	
	d					$ -	
		Item 4 Subtotal					$ -
5		Site Work					
	a	Site Work	1	LS	$ 20,000	$ 20,000	
	b					$ -	
	c					$ -	
	d					$ -	
		Item 4 Subtotal					$ 20,000

Direct Costs Subtotal	$	499,000
Contingency (+30%)	$	150,000
Total Direct Costs	$	649,000
Mobilization (+10%)	$	65,000
Construction Costs Subtotal	$	714,000
Contractor's Overhead and Profit (+20%)	$	143,000
TOTAL CONSTRUCTION COSTS (May 2012 dollars)	$	857,000
Engineering, Permitting, Construction Management, Project Administration, Legal Fees (+25%)	$	215,000
TOTAL PROJECT COSTS (May 2012 dollars)	$	1,072,000

Assumptions
1. Direct and Construction Costs rounded to the nearest $1000.

ENR Construction Cost Factors
ENR CCI - May 2012 9290

FLOOD MITIGATION PLAN
Binghamton-Johnson City Joint Sewage Treatment Plant
Vestal, New York

Flood Mitigation Costs
Table 4-3B: Relocate Electrical Panels Above Flood Zone - Terminal Pumping Station

Date: May 21, 2012

Item	Subitem	Description	Quantity	Units	Unit Cost	Subitem Cost	Item Cost
1		Electrical Equipment					
	a	MCC	1	LS	$ 100,000	$ 100,000	
	b	Switchgear	1	LS	$ 86,000	$ 86,000	
	c	Pump VFDs	4	EA	$ 23,000	$ 92,000	
	d					$ -	
		Item 1 Subtotal					$ 278,000
2		Installation, Wiring and Testing					
	a	Installation, Wiring and Testing	1	LS	$ 278,000	$ 278,000	
	b					$ -	
	c					$ -	
	d					$ -	
		Item 2 Subtotal					$ 278,000
3		Platform and Enclosure					
	a	Construct Platform and Base	1	LS	$ 68,000	$ 68,000	
	b	Enclosure	1	LS	$ 100,000	$ 100,000	
	c					$ -	
	d					$ -	
		Item 3 Subtotal					$ 168,000
4		Miscellaneous					
	a	Sitework	1	LS	$ 10,000	$ 10,000	
	b	Temporary Electrical for switchover	1	LS	$ 30,000	$ 30,000	
	c					$ -	
	d					$ -	
		Item 4 Subtotal					$ 40,000

Direct Costs Subtotal	$ 764,000
Contingency (+30%)	$ 229,000
Total Direct Costs	$ 993,000
Mobilization (+10%)	$ 99,000
Construction Costs Subtotal	$ 1,092,000
Contractor's Overhead and Profit (+20%)	$ 218,000
TOTAL CONSTRUCTION COSTS (May 2012 dollars)	$ 1,310,000
Engineering, Permitting, Construction Management, Project Administration, Legal Fees (+25%)	$ 328,000
TOTAL PROJECT COSTS (May 2012 dollars)	$ 1,638,000

Assumptions
1. Direct and Construction Costs rounded to the nearest $1000

ENR Construction Cost Factors
ENR CCI - May 2012 9290

FLOOD MITIGATION PLAN
Binghamton-Johnson City Joint Sewage Treatment Plant
Vestal, New York

Flood Mitigation Alternatives
Evaluation Summary - BJCJSTP
Table 5-1

	Alternative						
	Flood Barrier Walls	Waterproof Existing Structures	Relocation of Electrical Panels	Upgrade Equipment to Submersible Motors	Upgrade and Install Sump Pumps	Install Emergency Generators	Sediment Removal at Fuller Hollow Creek Outlet
Evaluation Criteria							
Level of Protection	Higher	Higher	Moderate	Moderate	Lower	Lower	Lower
Compatibility with Existing Facilities	Moderate	Lower	Lower	Lower	Moderate	Lower	Higher
Reliability	Higher	Lower	Moderate	Moderate	Lower	Moderate	Lower
Plant Facilities Accessible during Flooding	Yes	No	No	No	No	No	No
Project Costs (May 2012 dollars)	$12.3 M	$4.2 M	$4.9 M	$4.8 M	$6.9 M	$1.8 M - $8.6 M*	$9.8 M

* Installation of Generators Alternative includes several scenarios based on level of power generation provided.
Project Costs are based on ENR CCI for May 2012 of 9290.

FLOOD MITIGATION PLAN
Binghamton-Johnson City Joint Sewage Treatment Plant
Vestal, New York

Flood Mitigation Alternatives
Evaluation Summary - Terminal Pumping Station
Table 5-2

	Alternative						
	Flood Barrier Walls	Waterproof Existing Structures	Relocation of Electrical Panels	Upgrade Equipment to Submersible Motors	Upgrade and Install Sump Pumps	Install Emergency Generators	Sediment Removal at Fuller Hollow Creek Outlet
Evaluation Criteria							
Level of Protection	Higher	Higher	Moderate	NA	Lower	Lower	NA
Compatibility with Existing Facilities	Moderate	Lower	Lower	NA	Moderate	Lower	NA
Reliability	Higher	Lower	Moderate	NA	Lower	Moderate	NA
Pumping Station Accessible during Flooding	Yes	No	No	NA	No	No	NA
Project Costs (May 2012 dollars)	$4.1 M	$0.4 M	$1.6 M	NA	$1.3 M	$1.1 M	NA

Project Costs are based on ENR CCI for May 2012 of 9290.

FLOOD MITIGATION PLAN
Binghamton-Johnson City Joint Sewage Treatment Plant
Vestal, New York

Flood Mitigation Alternatives
Evaluation Summary - BJCJSTP
Table 5-1

	Alternative						
	Flood Barrier Walls	Waterproof Existing Structures	Relocation of Electrical Panels	Upgrade Equipment to Submersible Motors	Upgrade and Install Sump Pumps	Install Emergency Generators	Sediment Removal at Fuller Hollow Creek Outlet
Evaluation Criteria							
Level of Protection	Higher	Higher	Moderate	Moderate	Lower	Lower	Lower
Compatibility with Existing Facilities	Moderate	Lower	Lower	Lower	Moderate	Lower	Higher
Reliability	Higher	Lower	Moderate	Moderate	Lower	Moderate	Lower
Plant Facilities Accessible during Flooding	Yes	No	No	No	No	No	No
Project Costs (May 2012 dollars)	$12.3 M	$4.2 M	$4.9 M	$4.8 M	$6.9 M	$1.8 M - $8.6 M*	$9.8 M

* Installation of Generators Alternative includes several scenarios based on level of power generation provided.
Project Costs are based on ENR CCI for May 2012 of 9290.

BINGHAMTON-JOHNSON CITY JOINT SEWAGE TREATMENT PLANT HYDRAULIC STUDY OF FLOOD PROTECTION MEASURES

Prepared for:

Griffiths Engineering, LLC
13 S Washington Street
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January 24th, 2014

BINGHAMTON-JOHNSON CITY JOINT SEWAGE TREATMENT PLANT HYDRAULIC STUDY OF FLOOD PROTECTION MEASURES

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Appendix A

- Cross Section Location Map 1" = 500'
- HEC-RAS Computer Output - Existing Conditions (100 & 500-year)
- HEC-RAS Computer Output - Proposed Conditions (100 & 500-year)
- HEC-RAS Cross Section 195749 - Proposed Conditions
- DVD with HEC-RAS files

Appendix B

- Proposed Flood Protection Plans by Griffiths Engineering

1.0 Project Description and Location

This study consists of a hydraulic analysis to assess the construction of a proposed concrete T-Wall flood wall system that will provide 500-year flood protection of the Binghamton-Johnson City Joint Sewage Treatment Plant (the "Plant") which is located in the 100-year floodplain of the Susquehanna River in the Town of Vestal, New York (see Cross Section Location Map - Appendix A). The study will assess the proposed project impact (if any) on the 100 and 500-year water surface elevations along the study reach of the Susquehanna River.

The proposed flood protection includes approximately 1350'+/- of new concrete T-wall floodwall, 510+/-' of integral concrete wall, two passively activated floodgates, interior pumping systems and redundant gate closures for all penetrating utilities (see attached Site Plans - Appendix B). It is noted that the proposed flood protection design was developed by Griffiths Engineering of Binghamton, NY.

This study will specifically assess the hydraulic effects (if any) of the flood protection system on the water surface elevations and velocities of the Susquehanna River. Final floodplain mitigation measures (see discussion section 5.0) and interior stormwater removal are not included in this study. The final mitigation analysis and interior stormwater removal systems will be included in subsequent reports and in FEMA documentation for Conditional and Final Letters of Map Revisions (CLOMR and LOMR).

2.0 Existing Studies & Hydraulic Models

Review of the Existing (Effective) Flood Insurance Study (FIS) for the Town of Vestal, NY revealed that the Susquehanna River was studied by detailed methods. Since this analysis was completed over 30 years ago, more recent studies and hydraulic data were collected to perform this study. An ongoing update of the FIS for the Susquehanna River in Broome County is currently being undertaken by FEMA to prepare new Digital Flood Insurance Rate Maps (DFIRMS) along the Susquehanna River. The new FIS and DFIRMS utilize updated hydrology, stream cross section survey and floodplain LIDAR mapping that will be used to produce new 100-year base flood elevations, revised floodway mapping and 500-year floodplain mapping for the entire length of the Susquehanna and Chenango Rivers in New York State (as well as several other tributaries). A copy of the HEC-RAS computer model was obtained from FEMA's contractor (URS Corporation) and was used as the basis for the existing conditions model. The FEMA HEC-RAS model included analysis of the 10, 50, 100, June 2006, 500-year and 100-year Floodway events. It is noted that the FIS is still in a provisional status and has yet to be finalized and officially released by FEMA.

3.0 Hydrologic Analysis

The updated hydrologic data from the DFIRM HEC-RAS model was utilized for this analysis. In general, the peak discharges through the Town of Vestal reach of the Susquehanna River increased slightly (except for the 500-year recurrence interval) from those published in the original FIS.

Table 1 depicts the Original FIS peak discharge values versus those utilized in the DFIRM model.

Table 1 - Comparison of Peak Discharges

Flood Return Period	FIS discharge (cfs)	FEMA DFIRM (cfs)
10-year	72,000	79,448
50-year	100,000	104,090
100-year	114,000	114,664
500-year	160,000	138,998

4.0 Hydraulic Analysis

The 100-year and 500-year water surface profiles were developed for both existing and proposed conditions utilizing the DFIRM HEC-RAS computer program for the lower Susquehanna River. Initially, water surface profiles were produced for existing conditions utilizing the DFIRM existing model geometric file (Lower_Susquehanna_River_withLevee_Geometry). This existing condition model was modified to reflect five (5) additional river cross sections in the immediate vicinity of the proposed flood protection system. Modifications included five (5) new cross sections (XC 195368, XC 195574, XC 195749, XC 195956 and XC 196466) through the Plant site (see Cross Section Location Map - Appendix A). All other parameters of the existing DFIRM HEC-RAS model were unchanged. The revised existing conditions model geometric file is named "Joint Sewage - Existing Conditions".

Next, the proposed condition (with the proposed flood wall protection included) was modeled. The proposed condition was modeled by inserting a levee option in the location of the proposed flood protection as depicted in the attached plans. The proposed condition geometric file is named "Joint Sewage - Prop Flood Wall". A DVD with the HEC-RAS project, geometric and flow data files is included in Appendix A.

The hydraulic effect of the proposed project can be observed by comparing the water surface elevations for existing and proposed conditions at the cross sections through the project (195368 through 196186) and the upstream cross sections (196466 and 197129).

A summary of the 100-year and 500-year water surface elevations and average channel velocities for existing and proposed conditions are presented in Tables 2 and 3. Selected river cross sections showing the existing and proposed conditions through the proposed project are included in Appendix A.

Table 2 - Water Surface Elevations - Susquehanna River

River Station	Location	Existing Conditions		Proposed Conditions	
		100-year	500-year	100-year	500-year
197129	(FEMA Section) ≈1000′ u/s of proposed floodwall	839.95	842.98	839.95	842.98
196466	100′+/- upstream of proposed floodwall	839.76	842.79	839.76	842.79
196186	(FEMA Section) Plant Site, adjacent to middle sludge tank	839.69	842.72	839.68	842.71
195956	Plant site, adjacent to d/s sludge tank	839.62	842.66	839.61	842.65
195749	Plant site, u/s limit of gravel bar	839.54	842.57	839.54	842.57
195574	Plant site, adjacent to gravel bar	839.23	842.23	839.23	842.23
195368	Plant site, d/s end of gravel bar	839.26	842.27	839.25	842.27
195034	(FEMA Section) ≈850' d/s of proposed floodwall	839.06	842.09	839.06	842.09

Table 3 – Average Channel Velocities - Susquehanna River

River Station	Location	Existing Conditions		Proposed Conditions	
		100-year	500-year	100-year	500-year
197129	(FEMA Section) ≈1000′ u/s of proposed floodwall	5.60	5.98	5.60	5.98
196466	Plant Site, upstream end of proposed floodwall	5.49	5.89	5.49	5.89
196186	(FEMA Section) Plant Site, adjacent to middle sludge tank	5.42	5.80	5.48	5.86
195956	Plant site, adjacent to d/s sludge tank	5.45	5.82	5.47	5.86
195749	Plant site, u/s limit of gravel bar	5.57	5.95	5.57	5.96
195574	Plant site, adjacent to gravel bar	6.94	7.41	6.94	7.41
195368	Plant site, d/s limit of gravel bar	6.06	6.49	6.07	6.50
195034	(FEMA Section) ≈850' d/s of proposed floodwall	6.37	6.76	6.37	6.76

5.0 Conclusions & Recommendations

As can be noted from the elevations in Tables 2 and 3, the proposed floodwall protection at the Plant Site produces very minimal changes in water surface elevations and channel velocities. The proposed conditions water surface elevations adjacent to the proposed flood wall are the same or 0.01' lower than existing conditions. The slight drop in water surface elevations is due to a small corresponding increase in channel velocities (maximum increase 0.06'/sec @ XC 196186). At upstream cross sections XC 196466 and XC 197129, there is no change in water surface elevation or channel velocities. The minimal differences are because the proposed flood wall protection is generally located in a shallow depth, non-effective flow area of the 100-year and 500-year floodplain that are obstructed by the plant's buildings and infrastructure. Therefore, there is a minimal amount of displaced flow conveyance compared to the overall flow conveyance of the entire 100 and 500-year floodplain of the Susquehanna River. A HEC-RAS cross section plot of proposed conditions at XC 195749 graphically depicts this condition.

WEC also reviewed the DFIRM's to assess if the proposed flood protection system encroaches into the revised 100-year floodway limits. From our review it appears that a few portions of the proposed floodwall will encroach slightly into the revised DFIRM floodway limits.

Technically, if there is an encroachment into the floodway, it must be proven that no "zero" increases in water surface elevations will be created and that hazardous velocities will not be produced. With no rise in the 100-year water surface elevations and only a minimal increase in channel velocities (0.06'/sec maximum increase), it is our opinion that the proposed project does not have a significant hydraulic effect on the Susquehanna River and adheres to the National Flood Insurance Program and local (Town of Vestal and Village of Johnson City) municipal floodplain regulations.

Although the proposed project does not result in hydraulic impacts to the Susquehanna River, mitigation measures will be required to address ongoing operational problems with the Treatment Plant effluent pipe. The flow from the treatment plant's effluent pipe has been blocked by gravels depositing from Fuller Hollow Creek which enters the Susquehanna River just downstream of the treatment plant. When the effluent pipe was originally constructed, the effluent discharged directly into the main flow of the Susquehanna River. Due to years of gravel deposits from Fuller Hollow Creek, the river's main flow has shifted towards the north bank. This has caused the effluent's discharge to first flow upstream before it makes it way around the gravel bar. This torturous flow path reduces the mixing efficacy of the effluent, causing stagnation which poses water quality concerns. In addition, 3 of the 4 outlet ports of the effluent pipe are totally blocked by gravel deposits.

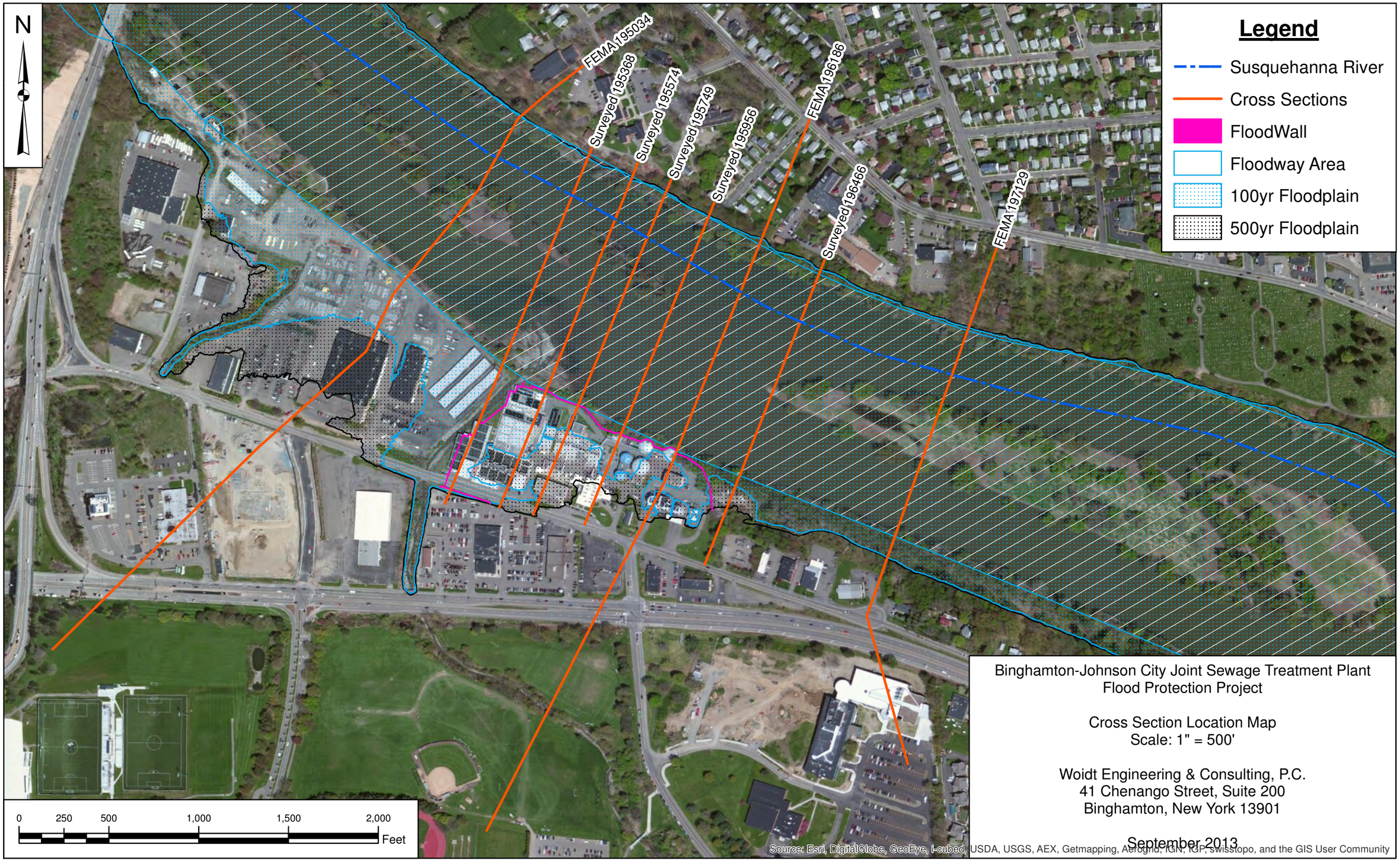
The mitigation goal is to restore the mixing efficacy of the effluent pipe and to mitigate future gravel deposits which would require dredging to maintain optimal mixing efficacy. The NYSDEC has recommended this be accomplished by restoring the Susquehanna's main channel flow along the south bank to ensure efficient mixing and to prevent the effluent from hugging the south bank.

Several mitigation alternatives to address the issues with the effluent pipe are currently being considered that involve gravel deposit removal and channel modifications to control future deposition from reforming. Once the proposed mitigation plan is finalized and designed, the hydraulic analysis will be updated to reflect the final proposed conditions. Since the mitigation

measures generally remove deposits from the Susquehanna River, it is anticipated that backwater elevations upstream of the plant will remain the same or slightly decrease.

The proposed top of flood protection should be set above the FEMA protection criteria for a critical facility (sewage treatment plants are considered a critical facility) which is the 500-year flood or the 100-year flood plus an additional 3' of freeboard, whichever is higher. Based on the results of the analysis, it is recommended that the top of floodwall at the Plant site be set at a minimum elevation of 843.50. The proposed top of wall elevation as depicted on Griffiths Engineering Floodwall Plans is 845.00 which exceeds the minimum FEMA levee/floodwall requirements. It is noted that all elevations are referenced to NGVD1988 datum.

It is understood that the HEC-RAS model utilized in the study is still provisional and that the final approved model and resultant floodplain mapping is subject to change. WEC will continue to coordinate with FEMA to insure that the final approved HEC-RAS model will not change the results or conclusions of this analysis.



Binghamton-Johnson City Joint Sewage Treatment Plant
Flood Protection Project

Cross Section Location Map
Scale: 1" = 500'

Woidt Engineering & Consulting, P.C.
41 Chenango Street, Suite 200
Binghamton, New York 13901

September 2013

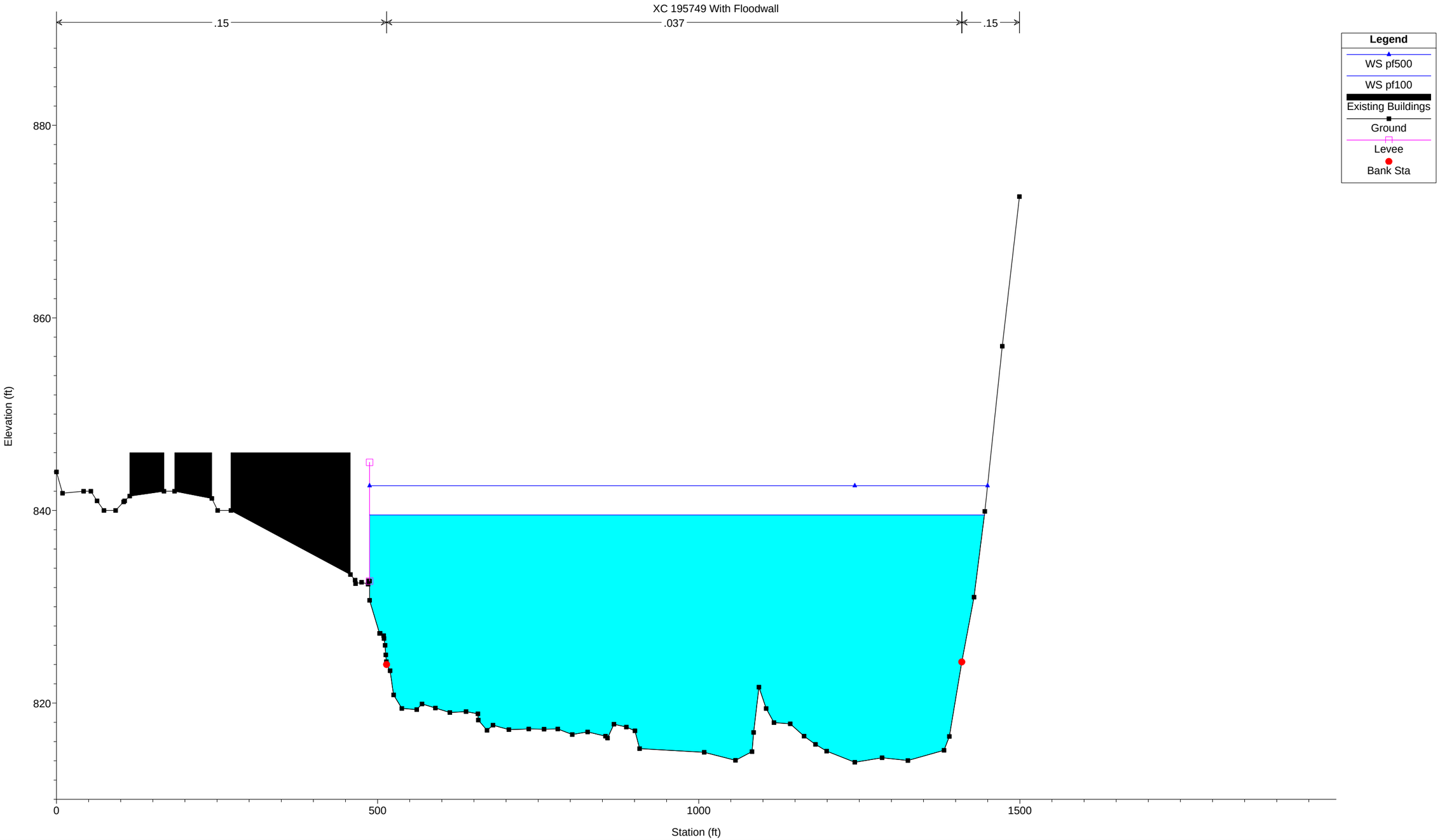
HEC-RAS Plan: Existing Cond River: 1 Reach: SusquehannaLower

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
SusquehannaLower	197129 3728.9	pf100	114664.00	811.95	839.95		840.44	0.000344	5.60	21193.44	1004.83	0.21
SusquehannaLower	197129 3728.9	pf500	138998.00	811.95	842.98		843.53	0.000335	5.98	24247.48	1013.70	0.21
SusquehannaLower	196466	pf100	114664.00	815.50	839.76		840.23	0.000275	5.49	21423.22	955.85	0.20
SusquehannaLower	196466	pf500	138998.00	815.50	842.79		843.32	0.000271	5.89	24399.71	1055.89	0.20
SusquehannaLower	196186 3711	pf100	114664.00	814.96	839.69	824.49	840.15	0.000279	5.42	21592.14	1047.83	0.20
SusquehannaLower	196186 3711	pf500	138998.00	814.96	842.72	825.57	843.24	0.000271	5.80	24788.13	1260.59	0.20
SusquehannaLower	195956	pf100	114664.00	815.20	839.62		840.08	0.000285	5.45	21616.20	1089.84	0.20
SusquehannaLower	195956	pf500	138998.00	815.20	842.66		843.18	0.000275	5.82	24931.25	1094.55	0.20
SusquehannaLower	195749	pf100	114664.00	813.85	839.54		840.02	0.000298	5.57	21274.27	987.44	0.20
SusquehannaLower	195749	pf500	138998.00	813.85	842.57		843.12	0.000288	5.95	24509.10	1147.11	0.21
SusquehannaLower	195574	pf100	114664.00	811.58	839.23		839.94	0.000439	6.94	20127.26	1030.40	0.25
SusquehannaLower	195574	pf500	138998.00	811.58	842.23		843.04	0.000427	7.41	23244.74	1046.72	0.25
SusquehannaLower	195368	pf100	114664.00	811.84	839.26		839.82	0.000321	6.06	21370.05	1251.86	0.22
SusquehannaLower	195368	pf500	138998.00	811.84	842.27		842.92	0.000315	6.49	24499.70	1265.93	0.22
SusquehannaLower	195034 3688	pf100	114664.00	810.99	839.06	825.23	839.69	0.000454	6.37	18839.65	1073.22	0.24
SusquehannaLower	195034 3688	pf500	138998.00	810.99	842.09	826.47	842.79	0.000435	6.76	22183.81	1419.63	0.24

HEC-RAS Plan: Prop Flood Wall River: 1 Reach: SusquehannaLower

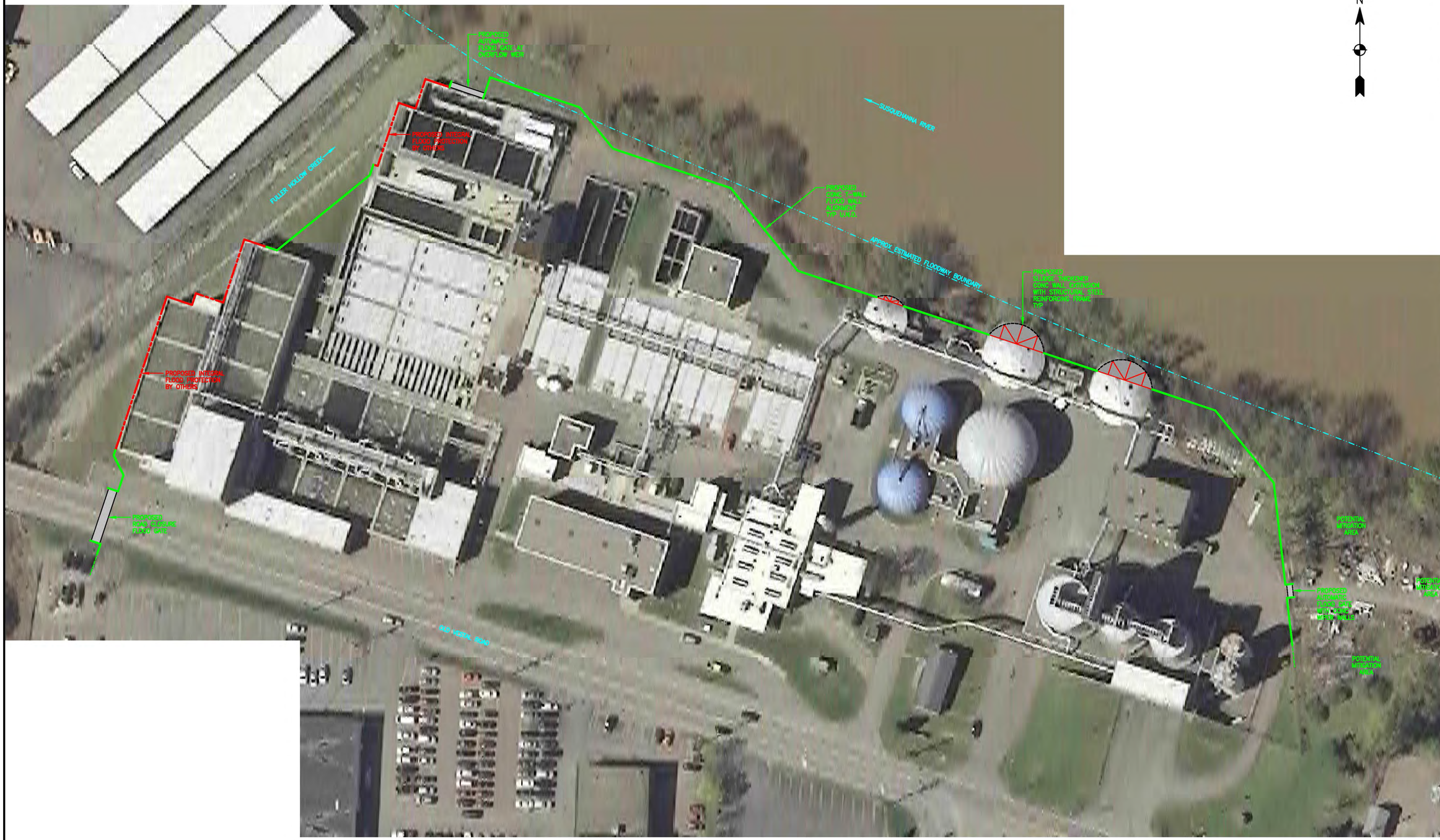
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
SusquehannaLower	197129 3728.9	pf100	114664.00	811.95	839.95		840.44	0.000344	5.60	21193.56	1004.83	0.21
SusquehannaLower	197129 3728.9	pf500	138998.00	811.95	842.98		843.53	0.000335	5.98	24248.65	1013.70	0.21
SusquehannaLower	196466	pf100	114664.00	815.50	839.76		840.23	0.000275	5.49	21423.28	955.85	0.20
SusquehannaLower	196466	pf500	138998.00	815.50	842.79		843.32	0.000271	5.89	24401.06	1055.89	0.20
SusquehannaLower	196186 3711	pf100	114664.00	814.96	839.68	824.67	840.15	0.000296	5.48	21096.97	942.29	0.20
SusquehannaLower	196186 3711	pf500	138998.00	814.96	842.71	825.79	843.24	0.000288	5.86	23961.03	947.32	0.20
SusquehannaLower	195956	pf100	114664.00	815.20	839.61	824.64	840.08	0.000287	5.47	21272.90	955.74	0.20
SusquehannaLower	195956	pf500	138998.00	815.20	842.65	825.74	843.18	0.000278	5.86	24179.22	960.44	0.20
SusquehannaLower	195749	pf100	114664.00	813.85	839.54	824.63	840.02	0.000298	5.57	21113.26	957.35	0.21
SusquehannaLower	195749	pf500	138998.00	813.85	842.57	825.73	843.12	0.000289	5.96	24024.45	962.25	0.21
SusquehannaLower	195574	pf100	114664.00	811.58	839.23	825.37	839.94	0.000438	6.94	20058.23	933.12	0.25
SusquehannaLower	195574	pf500	138998.00	811.58	842.23	826.66	843.04	0.000428	7.41	22867.92	940.62	0.25
SusquehannaLower	195368	pf100	114664.00	811.84	839.25		839.82	0.000321	6.07	21372.91	1251.85	0.22
SusquehannaLower	195368	pf500	138998.00	811.84	842.27		842.92	0.000316	6.50	24502.16	1265.92	0.22
SusquehannaLower	195034 3688	pf100	114664.00	810.99	839.06	825.23	839.69	0.000454	6.37	18839.65	1073.22	0.24
SusquehannaLower	195034 3688	pf500	138998.00	810.99	842.09	826.47	842.79	0.000435	6.76	22183.81	1419.63	0.24

Joint Sewage Plant - Flood Wall Plan: Joint Sewage - Proposed Flood Walls 1/28/2014



1 in Horiz. = 150 ft 1 in Vert. = 10 ft

FOR REVIEW PURPOSES ONLY



SCHEMATIC DESIGN NOTE:

THE PURPOSE OF THIS DRAWING IS FOR SCHEMATIC DESIGN PURPOSES ONLY AND IS NOT INTENDED FOR CONSTRUCTION. THE FLOOD WALL DIMENSIONS AND DETAILS SHOWN MAY VARY WIDELY PENDING FINAL GEOTECHNICAL EVALUATION, STORMWATER AND HYDROLOGICAL ANALYSIS OF THE SITE AND FINAL FLOOD WALL STABILITY AND STRUCTURAL COMPUTATIONS.

80' 40' 0' 40' 80'

GRAPHIC SCALE: 1"=40'

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Seal

Date: 11-29-2012
Rev.#
Designed by: GA
Drawn by: GA
Chkd by: DG
Project No.: 2012-116
Plot Scale: AS NOTED

UNAUTHORIZED ALTERATION OF THIS DRAWING IS A VIOLATION OF THE NEW YORK STATE EDUCATION LAW SECTION 7209, SUBDIVISION 2

Drawing Name:
SCHEMATIC SITE PLAN

Project Location:
OLD VESTAL ROAD
TOWN OF VESTAL
BROOME COUNTY, NY

Project Name:
BJCJSTP FLOOD WALL FEASIBILITY STUDY

Drawing Reference Number:
C-1
X OF X

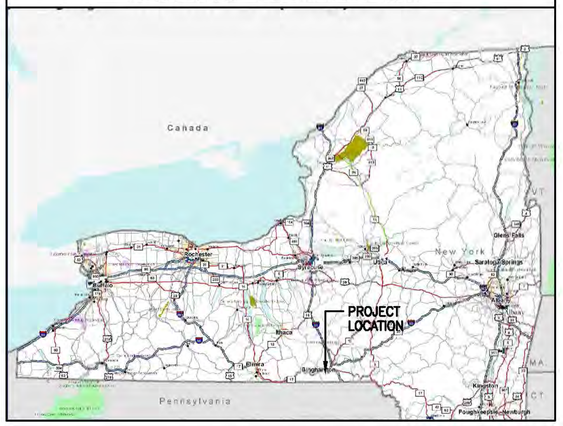
FOR REVIEW PURPOSES ONLY

BINGHAMTON–JOHNSON CITY JOINT SEWAGE TREATMENT PLANT FLOOD WALL

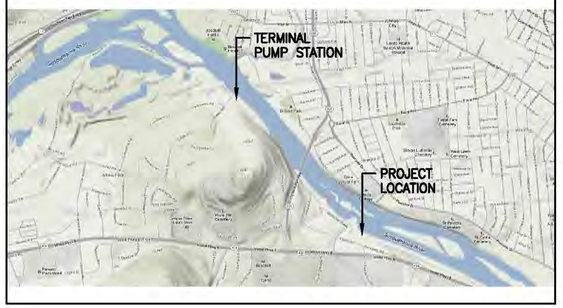
FEMA–4031–DR–NY
PW–02504

TOWN OF VESTAL
BROOME COUNTY
NEW YORK STATE

REGIONAL LOCATION MAP



LOCATION MAP



DRAWING LIST

DRAWINGS IN PROGRESS INDICATED BY SHADING

SHEET NO.	SHEET TITLE
T–1	TITLE SHEET
C–1	OVERALL SITE PLAN
C–2	PROPOSED SITE PLAN – EAST
C–3	PROPOSED SITE PLAN – NORTH
C–4	PROPOSED SITE PLAN – WEST
C–5	HORIZONTAL ALIGNMENT – EAST
C–6	HORIZONTAL ALIGNMENT – NORTH
C–7	HORIZONTAL ALIGNMENT – WEST
C–8	GRADING PLAN – EAST
C–9	GRADING PLAN – NORTH
C–10	GRADING PLAN – WEST
C–11	FLOOD WALL PROFILES 1
C–12	(NOT IN PLAN SET) FLOOD WALL PROFILES 2
C–13	MISCELLANEOUS DETAILS 1
C–14	MISCELLANEOUS DETAILS 2
C–15	MISCELLANEOUS DETAILS 3
C–16	TABULATED SCHEDULES
C–17	NYSDEC E&SC DETAILS
S–1	STRUCTURAL SECTIONS 1
S–2	STRUCTURAL SECTIONS 2
S–3	STRUCTURAL SECTIONS 3
S–4	STRUCTURAL SECTIONS 4
S–5	STRUCTURAL SECTIONS 5
S–6	STRUCTURAL SECTIONS 6
S–7	STRUCTURAL DETAILS 1
S–8	STRUCTURAL DETAILS 2
S–9	ROADWAY FLOOD GATE SECTIONS
S–10	MISCELLANEOUS STRUCTURAL DETAILS 1
S–11	MISCELLANEOUS STRUCTURAL DETAILS 2
S–12	MISCELLANEOUS STRUCTURAL DETAILS 3

November 12, 2014

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