

## ARLINGTON COUNTY WATER POLLUTION CONTROL PLANT MASTER PLAN 2001 UPDATE

### TECHNICAL MEMORANDUM XIX – EXISTING WASTEWATER PUMPING STATION UPGRADES

#### 1. BACKGROUND

We have met with the County to determine the parameters for the evaluations of the existing Pumping Stations. As a basis the following criteria were established:

- *Increase station capacity to meet present and future flow requirements*
- *Replace equipment that is out of date or is worn out*
- *Improve security*
- *Structural and Architectural improvements*
- *Provide 24 hour fuel supply for standby emergency generators*
- *Provide for temperature and humidity control*
- *Address odor, noise and environmental issues*
- *Operator concerns*

We have visited the pumping stations. We have spoken to operating personnel regarding the operation of the County's wastewater pumping stations and have included their concerns. The upgrade construction costs included engineering and administration costs. Costs are based on 2002 dollars.

## **2. PUMP STATIONS AND EJECTOR STATIONS**

### **2.1 Donaldson Run Pumping Station**

The Donaldson Run Pumping Station is located at 2929 North Military Road in the northeastern part of the County. The station is a conventional wetwell/drywell facility. There are three extended shaft pumping units of 50 horsepower installed in the station. Two pumping units have variable speed drives and one pumping unit is constant speed. The existing facility has a safe pumping capacity of 1.33 MGD. The projected station buildout capacity is 5.41 MGD. The station has a 180 KW emergency generator for standby electrical power. A list of improvements is as follows:

- *Rehabilitate pumping units to maintain capacity*
- *Replace variable speed drives*
- *Rehabilitate cone valves*
- *Replace bubbler system*
- *Site improvements for erosion control, Chesapeake Bay protections and storm water management*
- *Equipment modification for SCADA system*
- *Replace rear door*
- *Provide provisions for odor control*
- *Building security system*
- *Exterior building reconditioning*

The estimated project cost for these improvements is \$590,000.

- 2.2 To upgrade this pumping station to meet the buildout capacity of 5.41 MGD would require new pumping units, suction and discharge headers, valves, flowmeter, suction bells through the wall, VFD's, starters, wiring, transfer switch and emergency generator. An upgrade to the electrical service to the station will be required. The force main will also be required to be upgraded from 8 inches to 14 inches.

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2.2 The estimated project cost for this improvement is \$ 1,000,000. This cost does not include the cost to upgrade the force main or to provide a new electrical service.

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2.2 **Gulf Run Pumping Station**

The Gulf Run Pumping Station is located at 3560 North Military Road in the northeastern part of the County. The station is a conventional wetwell/drywell facility. There are three extended shaft pumping units of 150 horsepower installed in the station. Two pumping units have variable speed drives and one pumping unit is constant speed. The existing facility has a safe pumping capacity of 3.4 MGD. The projected station buildout capacity is 5.77 MGD. The station has a 500 KW emergency generator for standby electrical power. A list of improvements is as follows:

- *Rehabilitate pumping units to maintain capacity*
- *Replace variable speed drives*
- *Rehabilitate cone valves*
- *Replace bubbler system*
- *Site improvements for erosion control, Chesapeake Bay protections and storm water management*
- *Equipment modification for SCADA system*
- *Repair leak in wall between Generator Room and Wet Well*
- *Replace rear door*
- *Provide provisions for odor control*
- *Building security system*
- *Exterior building reconditioning*

The estimated project cost for these improvements is \$690,000.

2.2 To upgrade this pumping station to meet the buildout capacity of 5.77 MGD would require new pumping units, suction and discharge headers, valves, flowmeter, suction bells through the wall, VFD's, starters, wiring, transfer switch and emergency generator. An upgrade

to the electrical service to the station will be required. The force main will also be required to be upgraded from 12 inches to 14 inches.

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2.2 The estimated project cost for this improvement is \$ 1,365,000. This cost does not include the cost to upgrade the force main or to provide a new electrical service.

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### **2.3 Kirkwood Pumping Station**

The Kirkwood Pumping Station is located at 1616 Kirkwood Road in the central part of the County. The station is a conventional wetwell/drywell facility. There are four extended shaft pumping units of 100 horsepower installed in the station. Two pumping units have variable speed drives and two pumping units are constant speed. The existing facility has a safe pumping capacity of 7.2 MGD. The projected station buildout capacity is 9.96 MGD. The facility has a split wetwell with two mechanically cleaned bar screens and grinders. The station has a 350 KW emergency generator for standby electrical power. A list of improvements is as follows:

- *Replace variable speed drives*
- *Rehabilitate cone valves*
- *Provide ventilation for screen area*
- *Site improvements for erosion control, Chesapeake Bay protections and storm water management*
- *Equipment modification for SCADA system*
- *Replace front door*
- *Building security system*
- *Install battery backup emergency lighting in lower two levels*

The estimated project cost for these improvements is \$320,000.

2.2 To upgrade this pumping station to meet the buildout capacity of 9.96 MGD would require replacement of the 1390 gpm pumping units with new 2500 gpm pumping units and VFD's.

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2.2 The estimated project cost for this improvement is \$180,000.

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## **2.4 Windy Run Pumping Station**

The Windy Run Pumping Station is located at 2500 North Kenmore Street in the northeastern part of the County. The station is a conventional wetwell/drywell facility. There are two extended shaft pumping units of 50 horsepower installed in the station. Two pumping units are constant speed. The existing facility has a safe pumping capacity of 2.6 MGD. The projected station buildout capacity is 2.5 MGD. The station has a 260 KW emergency generator for standby electrical power. A list of improvements is as follows:

- *Rehabilitate cushion check valves*
- *Replace bubbler system*
- *Site improvements for erosion control, Chesapeake Bay protections and storm water management including driveway*
- *Equipment modification for SCADA system*
- *Provide new generator controls*
- *Provide provisions for odor control*
- *Building security system*
- *Exterior building reconditioning*
- *Update lighting in lower levels*
- *Add capacitors to pump motors to improve power factor*

The estimated project cost for these improvements is \$440,000

## **2.5 Roaches Run Pumping Station**

The Roaches Run Pumping Station is located at 550 South Clark Street in the eastern part of the County. The station is a conventional wetwell/drywell facility. There are four extended shaft pumping units of 60 and 75 horsepower installed in the station. The two 75 horsepower pumping units have variable speed drives and the two 60 horsepower pumping units are constant speed. The existing facility has a safe pumping capacity of 14.4 MGD. The projected station buildout capacity is 5.80 MGD. The facility has a split wetwell with two mechanically cleaned bar screens. The station has a 250 KW emergency generator for standby electrical power. A list of improvements is as follows:

- *Replace variable speed drives*
- *Provide a large hydropneumatic tank for non-potable water use*
- *Site improvements for erosion control, Chesapeake Bay protections and storm water management*
- *Equipment modification for SCADA system*
- *Structural repairs to pipe supports*
- *Analysis to determine cause of pipe support cracks*
- *Building security system*
- *Add capacitors to constant speed pump motors to improve power factor*

The estimated project cost for these improvements is \$140,000.

## **2.2 2.6 Dover Run Pumping Station**

The Dover Run Pumping Station is located at 2801 North Quebec Street in the northeastern part of the County. The station is a conventional wetwell/drywell facility. There are two close coupled pumping units of 25 horsepower installed in the station. The two pumping units are constant speed. The existing facility has a safe pumping capacity of 0.4 MGD. The projected station buildout capacity is 0.4 MGD. The station has a 60 KW emergency generator for standby electrical power. A list of improvements is as follows:

- *Provide ventilation system for Screen Room*
- *Site improvements for erosion control, Chesapeake Bay protections and storm water management, replacement of driveway*
- *Equipment modification for SCADA system*
- *Exterior building reconditioning*
- *Update lighting*
- *Building security system*

The estimated project cost for these improvements is \$210,000.

### **2.2 2.7 National Center Ejector Station**

The National Center Ejector Station is located at 2525 South Eads Road in the southeastern part of the County. There are three 400 gallon ejector pots located in the lower level of the ejector station and three 15 horsepower air compressors located in the grade level of the station. The existing facility has a capacity of 1.15 MGD. The projected station buildout capacity is 1.73 MGD. The station has a 45 KW emergency generator for standby electrical power. The County has experienced problems operating this station due the large amount of flow it receives from Crystal City. A new pumping station with submersible or dry pit submersible pumping units is recommended. The existing facility must be kept in continuous operating while the new station is being constructed. Due to the site limitations, additional property adjacent to the site may need to be obtained. A list of improvements is as follows:

- *Replace ejector station with a new pumping station*
- *Equipment modification for SCADA system*

The estimated project cost for this improvements is \$1,880,000.

### **2.2 2.8 Riverwood Ejector Station**

The Riverwood Ejector Station is located at 2770 North Nelson Street in the notheastern part of the County. The Ejector Station is located completely underground. There are two 50 gallon ejector pots located in the lower level of the ejector station and two 10 horsepower air compressors located in the intermediate level of the station. The existing facility has a pumping capacity of 0.14 MGD. The projected station buildout capacity is 0.14 MGD. The station has provisions for connection to a portable emergency generator for standby electrical power. A list of improvements is as follows:

- *Rehabilitate ejectors, valves and controls*
- *Improve air compressors controls to bring lag compressor to lead position*
- *Site improvements for erosion control, Chesapeake Bay protections and storm water management*
- *Equipment modification for SCADA system*

- *Repair ground water leaks in structure*
- *Add heating units to the station for winter use*
- *Increase ventilation rate to improve heat removal*
- *Exterior structure reconditioning*

The estimated project cost for these improvements is \$190,000

## **2.9 River Estates Ejector Station**

The River Estates Ejector Station is located at 3533 North 36<sup>th</sup> Street in the northern part of the County. The Ejector Station is located completely underground. There are two 30 gallon ejector pots located in the lower level of the ejector station and two 2 horsepower air compressors located in the intermediate level of the station. The existing facility has a pumping capacity of 0.09 MGD. The projected station buildout capacity is 0.09 MGD. The station has provisions for connection to a portable generator for standby electrical power. A list of improvements is as follows:

- *Replace ejector units, piping, air compressors and controls*
- *Concrete rehabilitation as needed*
- *Site improvements for erosion control, Chesapeake Bay protections and storm water management*
- *Equipment modification for SCADA system*
- *Repaint interior*
- *Provide new access hatch*

The estimated project cost for these improvements is \$135,000.

### **2.2 2.10 Marcey Creek Pumping Station**

The Marcey Creek Pumping Station is located at 2685 Marcey Road in the northeastern part of the County. The station is a package wetwell/drywell facility. There are two close coupled pumping units of 7.5 horsepower installed in the station. The pumping units are constant speed. The existing facility has a safe pumping capacity of 0.14 MGD. The projected station

buildout capacity is 0.20 MGD. The station has provisions for connection to a portable generator for standby electrical power. The station is starting to corrode as ground water is beginning to enter into the pumping station. Replacement of the anodes may not stop the corrosion or leaks into the station. Consideration should be given to perform an evaluation of the station and its possible replacement if the corrosion can not be repaired. A list of improvements are as follows:

- *Temporary corrosion repair until new station is installed*
- *New pumping station with safe pumping capacity of 0.20 MGD*
- *Equipment modification for SCADA system*

The estimated project cost for these improvements is \$285,000.

## **2.2 2.11 Rivercrest Pumping Station**

The Rivercrest Pumping Station is located at 3560 North 36<sup>th</sup> Street in the northern part of the County. The pumps are mounted in the wetwell with the motors mounted on a plate on top of the wetwell. There are two pumping units of 2 horsepower installed in the station. The two pumping units are constant speed. The existing facility has a safe pumping capacity of 0.29 MGD. The projected station buildout capacity is 0.29 MGD. The station has provisions for connection to a portable generator for standby electrical power. A list of improvements is as follows:

- *Repair leaks in walls at pipe penetrations*
- *Replace or repair plates where pumps motors are supported*
- *Provide new access hatch*
- *Site improvements for erosion control, Chesapeake Bay protections and storm water management*
- *Equipment modification for SCADA system*

The estimated project cost for these improvements is \$130,000.

## **2.2 2.12 Palisades Pumping Station**

The Palisades Pumping Station is located at 2200 North Scott Street in the northeastern part of

the County. The station is a package wetwell/drywell facility. There are two close coupled pumping units of 5 horsepower installed in the station. The pumping units are constant speed. The existing facility has a safe pumping capacity of 0.21 MGD. The projected station buildout capacity is 0.21 MGD. This station experiences frequent clogging of the pump. The station has a 60 KW emergency generator for standby electrical power. A list of improvements are as follows:

- *Replace wetwell hatch*
- *Site improvements for erosion control, Chesapeake Bay protections and storm water management*
- *Equipment modification for SCADA system*
- *Provide comminutor in wetwell to reduce solid sizes*

The estimated project cost for these improvements is \$130,000.



4. ESTIMATED IMPROVEMENT COSTS

4.01 Donaldson Run Pumping Station

	Items	Cost	
A.	Rehabilitate pumping units to maintain capacity	\$30,000	3 pumps
B.	Replace variable speed drives (2-60hp; 30 hp RVAT)	\$30,000	
C.	Rehabilitate cone valves	\$18,000	3x6"
D.	Replace bubbler system	\$5,000	
E.	Site improvements for erosion control, Chesapeake Bay protections and storm water management	\$20,000	
F.	Equipment modification for SCADA system	\$35,000	
G.	Replace rear door	\$3,000	fiberglass
H.	Provide provisions for odor control	\$160,000	
I.	Building security system	\$2,500	
J.	Exterior building reconditioning	\$15,000	
		Subtotal	\$318,500
		Contingencies at 35%	\$111,475
		Subtotal	\$429,975
		Project Management, Engineering, at 35%	\$150,491
		<b>TOTAL CAPITAL COST</b>	<b>\$580,466</b>
		<b>SAY</b>	<b>\$590,000</b>







4.3 Kirkwood Pumping Station

Items	Cost	
A. Replace variable speed drives (2-100 hp)	\$40,000	
B. Rehabilitate cone valves	\$56,000	4x14"
C. Provide ventilation for screen area	\$10,000	
D. Site improvements for erosion control, Chesapeake Bay protections and storm water management	\$20,000	
E. Equipment modification for SCADA system	\$35,000	
F. Replace front door	\$6,000	fiberglass
G. Building security system	\$2,500	
H. Install battery backup emergency lights in two lower levels	\$5,000	
	Subtotal	\$174,500
	Contingencies at 35%	\$61,075
	Subtotal	\$235,575
	Project Management, Engineering, at 35%	\$82,451
	<b>TOTAL CAPITAL COST</b>	<b>\$318,026</b>
	<b>SAY</b>	<b>\$320,000</b>

**4.3.1 Pumps/Electrical For Increased Flow To Buildout**

	Items	Cost
A.	2 New pumps (75 hp)	\$54,000
B.	2 New Variable Speed Drives	\$34,000
C.	Concrete Base	\$4,000
D.	Electrical	\$6,000
	Subtotal	\$98,000
	Contingencies at 35%	\$34,300
	Subtotal	\$132,300
	Project Management, Engineering, at 35%	\$46,305
	<b>TOTAL CAPITAL COST</b>	<b>\$178,605</b>
	<b>SAY</b>	<b>\$180,000</b>

4.4 Windy Run Pumping Station

Items	Cost
A. Rehabilitate cushion check valves	\$4,000
B. Replace bubbler system	\$5,000
C. Site improvements for erosion control, Chesapeake Bay protections and storm water management including driveway	\$40,000
D. Equipment modification for SCADA system	\$35,000
E. Provide new generator controls	\$5,000
F. Provide provisions for odor control	\$120,000
G. Building security system	\$2,500
H. Exterior building reconditioning	\$20,000
I. Update lighting in lower levels	\$5,000
J. Add capacitors to pump motors to improve power factor	\$3,500
	Subtotal \$240,000
	Contingencies at 35% \$84,000
	Subtotal \$324,000
	Project Management, Engineering, at 35% \$113,400
	<b>TOTAL CAPITAL COST \$437,400</b>
	<b>SAY \$440,000</b>

4.5 Roaches Run Pumping Station

Items	Cost	
A. Replace variable speed drives (2-75 hp; 2-60 ALS)	\$30,000	
B. Provide a large hydropneumatic tank for non-potable water use	\$10,000	210 gal
C. Site improvements for erosion control, Chesapeake Bay protections and storm water management	\$20,000	
D. Equipment modification for SCADA system	\$35,000	
E. Structural repairs to pipe supports	\$5,000	
F. Analysis to determine cause of pipe support cracks	\$10,000	
G. Building security system	\$2,500	
H. Add capacitors to constant speed pump motors to improve power factor	\$3,500	
	Subtotal	\$76,000
	Contingencies at 35%	\$26,600
	Subtotal	\$102,600
	Project Management, Engineering, at 35%	\$35,910
	<b>TOTAL CAPITAL COST</b>	<b>\$138,510</b>
	<b>SAY</b>	<b>\$140,000</b>





4.8 Riverwood Ejector Station

Items	Cost	
A. Rehabilitate ejectors, valves and controls	\$8,000	2 pots
B. Improve air compressor controls to bring lag compressor to lead position	\$2,000	
C. Site improvements for erosion control Chesapeake Bay protections and storm water management	\$20,000	
D. Equipment modification for SCADA system	\$15,000	
E. Repair ground water leaks in structure	\$5,000	
F. Add heating units to the station for winter use	\$30,000	
G. Increase ventilation rate to improve heat removal	\$2,000	
H. Exterior structure reconditioning	\$20,000	
	Subtotal	\$102,000
	Contingencies at 35%	\$35,700
	Subtotal	\$137,700
	Project Management, Engineering, at 35%	\$48,195
	<b>TOTAL CAPITAL COST</b>	<b>\$185,895</b>
	<b>SAY</b>	<b>\$190,000</b>







