Chapter 11 Implementation

The implementation plan outlined in Chapter 11 of the Master Plan establishes the steps associated with the design and construction of water and wastewater improvement projects that are needed to meet projected growth in service demand during the planning period. **Timing of the proposed projects will depend on the actual or desired rate of development within the County and available project funding**.

Tables 1-1 through 11-4 outline the projected water and wastewater system improvements by service area, summarizing the following information:

- Name of system improvement.
- Budgetary cost estimate in 2015 dollars.
- The type of project is distinguished by whether the purpose is to primarily increase service reliability (S), provide capacity for growth (G), or to rehabilitate existing infrastructure (R).
- Planning period in which the project is projected to be needed based on demand estimates. It should be noted that the planning, permitting, engineering, and construction for projects can take at least 3 to 5 years (actual timeframe dependent on project complexity); therefore, adequate time should be planned for to complete projects.
- The recommended projects included in this Master Plan are conceptual and are for high-level planning purposes. When the County is ready to proceed with a specific project, it is recommended that a Preliminary Engineering Report (PER) be completed to evaluate the project in detail and to provide more refined budget cost estimates. The PER will also be required to obtain state regulatory approvals.

Community Improvements projects listed in **Table 1-5** for water and wastewater improvements are listed in general order of priority. The priority for the fire flow improvements were generally based on difference between fire flow availability and fire flow goals. Sewer system priority was based on a few factors including service reliability and system capacity. The final project priority should be determined by the County.

Figures showing the location of these projects are located in Chapters 9 and 10.

Table 11-1 Prince George Route 301 Water and Wastewater Service Area (Recommended Projects Needed Based on Growth Projections)

Water Improvement Project	**Planning Period**				
	Com. Improvements	**A**	**B**	**C**	**D**
w301-A-01: Route 301 Water Supply Extension (G)		$ 5,080,000			
w301-C-01: Cedarwood Service Extension (S)				$ 1,700,000	
w301-D-01: Route 301 Service Extension (G)					$ 1,120,000
w301-D-02: Route 301 Booster Pump Station Upgrade (G)					$ 100,000
w301-D-03: Walton Lake Road Service Extension (S)					$ 5,090,000
Prince George Water Improvements Subtotal	***$ -***	***$ 5,080,000***	***$ -***	***$ 1,700,000***	***$ 6,310,000***
Wastewater Improvement Project	**Planning Period**				
	Com. Improvements	**A**	**B**	**C**	**D**
s301-D-01: Route 301 Service Extension (G)					$ 1,120,000
s301-D-02: Route 301 Sanitary Sewer Upgrades (G)					$ 2,210,000
Prince George Wastewater Improvements Subtotal	***$ -***	***$ -***	***$ -***	***$ -***	***$ 3,330,000***
Total Prince George Route 301 Service Area Improvement Cost Estimate	**$ -**	**$ 5,080,000**	**$ -**	**$ 1,700,000**	**$ 9,640,000**

1. Budgetary cost estimates for water supply or wastewater disposal connections do not include improvements outside of Prince George County

Table 11-2 Prince George Route 10 Water and Wastewater Service Area (Recommended Projects Needed Based on Growth Projections)

Water Improvement Project	**Planning Period**				
	Com. Improvements	**A**	**B**	**C**	**D**
w010-A-01: Route 10 Water Supply Improvements (GS)		$ 5,290,000			
w010-C-01: Route 10 Booster Pump Station Upgrade (G)				$ 100,000	
Prince George Route 10 Water Improvements Subtotal	***$ -***	***$ 5,290,000***	***$ -***	***$ 100,000***	***$ -***
Wastewater Improvement Project	**Planning Period**				
	Com. Improvements	**A**	**B**	**C**	**D**
s010-2035-01: Route 10 Service Extension (G)				$ 6,850,000	
Prince George Wastewater Improvements Subtotal	***$ -***	***$ -***	***$ -***	***$ 6,850,000***	***$ -***
Total Prince George Route 10 Service Area Improvement Cost Estimate	**$ -**	**$ 5,290,000**	**$ -**	**$ 100,000**	**$ -**

1. Budgetary cost estimates for water supply or wastewater disposal connections do not include improvements outside of Prince George County

Table 11-3 Prince George Puddledock Wastewater Service Area (Recommended Projects Needed Based on Growth Projections)

Wastewater Improvement Project	**Planning Period**				
	Com. Improvements	**A**	**B**	**C**	**D**
sPUD-B-01: Puddledock Regional Pump Station (G)			$ 6,320,000		
sPUD-C-01: River Road Service Extension (G)				$ 5,610,000	
Prince George Wastewater Improvements Subtotal	***$ -***	***$ -***	***$ 6,320,000***	***$ 5,610,000***	***$ -***
Total Puddledock Service Area Improvement Cost Estimate	**$ -**	**$ -**	**$ 6,320,000**	**$ 5,610,000**	**$ -**

1. Budgetary cost estimates for water supply or wastewater disposal connections do not include improvements outside of Prince George County

Table 11-4 Prince George Central Water and Wastewater Service Area (Recommended Projects Needed Based on Growth Projections)

Water Improvement Project	**Planning Period**				
	Com. Improvements	**A**	**B**	**C**	**D**
wCEN-A-01: Central System Water Supply Project (GS)		$ 24,640,000			
wCEN-A-03: Food Lion Water Facility Improvements (GS)		$ 1,500,000			
wCEN-B-01: Route 156 Booster Pump Station and Water Service Extension (GS)			$ 4,190,000		
wCEN-B-02: Route 156 Water Service Extension (GS)			$ 2,870,000		
wCEN-C-01: Central System Water Supply Booster Pump Station Upgrade (GS)				$ 1,360,000	
wCEN-C-02: Rives Road Water Service Extension (G)				$ 1,320,000	
wCEN-C-03: River Road Water Service Extension (G)				$ 1,030,000	
wCEN-C-04: Puddledock Booster Pump Station (G)				$ 4,350,000	
wCEN-D-01: Route 156 Waterline Loop (GS)					$ 880,000
wCEN-D-02: Sandy Ridge Road Waterline Loop (GS)					$ 1,140,000
wCEN-D-03: Southpoint Elevated Storage Tank (G)					$ 2,680,000
Prince George Central Service Area Water Improvements Subtotal	***$ -***	***$ 26,140,000***	***$ 7,060,000***	***$ 8,060,000***	***$ 4,700,000***
Wastewater Improvement Project	**Planning Period**				
	Com. Improvements	**A**	**B**	**C**	**D**
sCEN-A-01: Blackwater Regional Sewer Interceptor (GS)		$ 24,140,000			
sCEN-A-02: Decommission SPS-002 (GS)		$ 810,000			
sCEN-B-01: Route 156 Service Extension (G)			$ 980,000		
sCEN-B-02: Second Swamp Regional Interceptor and Pump Station (Phase 1) (GS)			$ 8,720,000		
sCEN-B-03: Decommission SPS-003 (GS)			$ 450,000		
sCEN-B-04: 6.5 MGD Blackwater Swamp Regional Pump Station Upgrade (G)			$ 400,000		
sCEN-B-05: 9.0 MGD Route 10 Regional Pump Station Upgrade (G)			$ 500,000		
sCEN-C-01: Second Swamp Regional Interceptor (Phase 2) (GS)				$ 5,550,000	
sCEN-C-02: Decommission SPS-001 (GS)				$ 800,000	
sCEN-C-03: Decommission SPS-008 & SPS-016 (GS)				$ 1,040,000	
sCEN-C-04: Decommission SPS-021 (GS)				$ 1,330,000	
sCEN-C-05: Rives Road Service Extension (G)				$ 2,100,000	
sCEN-D-02: Route 106 and Route 156 Development Extension (G)					$ 5,870,000
Prince George Central Service Area Wastewater Improvements Subtotal	***$ -***	***$ 24,950,000***	***$ 11,050,000***	***$ 10,820,000***	***$ 5,870,000***
Total Prince George Central Service Area Improvement Cost Estimate	**$ -**	**$ 51,090,000**	**$ 18,110,000**	**$ 18,880,000**	**$ 10,570,000**

1. Budgetary cost estimates for water supply or wastewater disposal connections do not include improvements outside of Prince George County

Table 11-5 Prince George Community Improvement Projects

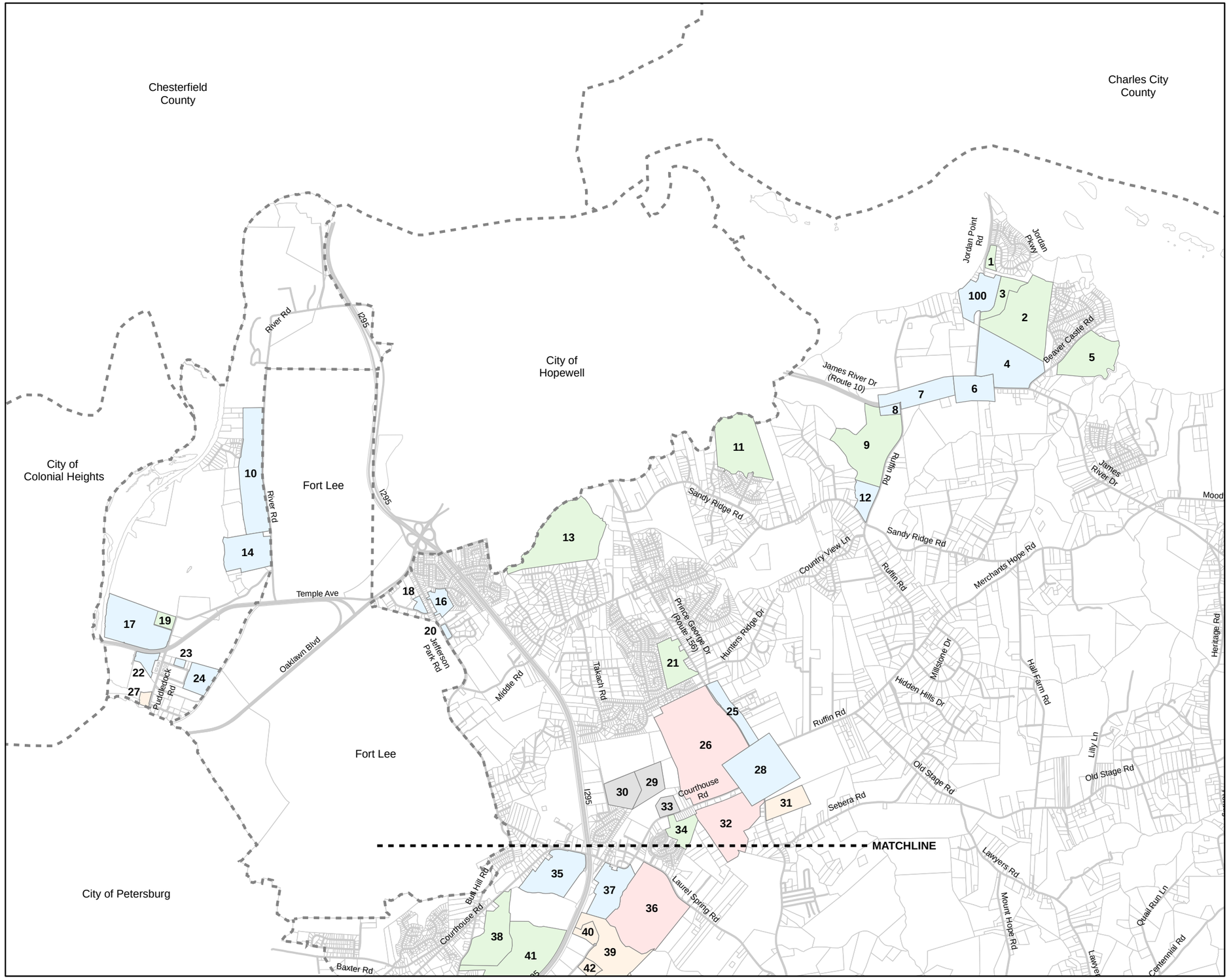
Water Improvement Project	Planning Period				
	Com. Improvements	A	B	C	D
w010-CI-01: Beechwood Manor Fireflow Improvements (S)[2]	$ 890,000				
w010-CI-02: Jordan on the James Fireflow Improvements (S)[2]	$ 1,420,000				
w010-CI-03: Rivers Edge Fireflow Improvements (S)[2]	$ 1,360,000				
wCEN-CI-05: Birchett Estates Fireflow Improvements (S)	$ 1,290,000				
wCEN-CI-01: Commonwealth Acres Fireflow Improvements (S)	$ 710,000				
wCEN-CI-04: Manchester Mill Fireflow Improvements (S)	$ 840,000				
wCEN-CI-02: Lee Acres Fireflow Improvements (S)	$ 340,000				
wCEN-CI-03: Rolling Meadows and Hidden Oaks Fireflow Improvements (S)	$ 480,000				
wCEN-CI-06: Puddledock Fireflow Improvements (S)	$ 1,020,000				
wCEN-CI-07: River Road Fireflow Improvements (S)	$ 990,000				
wCEN-CI-08: Scott Park Water Service Extension Phase 1 (G)	$ 680,000				
wCEN-CI-09: Scott Park Water Service Extension Phase 2 (G)	$ 580,000				
Prince George Central Service Area Water Improvements Subtotal	***$ 4,380,000***	***$ -***	***$ -***	***$ -***	***$ -***
Wastewater Improvement Project	**Planning Period**				
	Com. Improvements	**A**	**B**	**C**	**D**
s301-CI-01: SPS-006 Pump Station Rehabilitation (RG)	$ 713,000				
sCEN-CI-01: Route 301 and Route 460 I&I Evaluation	$ 25,000				
sCEN-CI-02: Scott Park Sewer Service Extension Phase 1 (G)	$ 340,000				
s010-CI-01: Rivers Edge Service Extension (S)	$ 1,430,000				
s010-CI-02: Beechwood Manor Service Extension (S)	$ 1,250,000				
Prince George Central Service Area Wastewater Improvements Subtotal	***$ 3,045,000***	***$ -***	***$ -***	***$ -***	***$ -***
Total Community Improvement Cost Estimate	**$ 7,425,000**	**$ -**	**$ -**	**$ -**	**$ -**

1. Budgetary cost estimates for water supply or wastewater disposal connections do not include improvements outside of Prince George County

2. Route 10 Fire Flow Improvements are dependent upon the Route 10 water supply improvements project (w010-A-01).

Appendix A:
Future Development Demands

www.dewberry.com



N

W E

S

Legend

- Road Centerlines
- TaxParcels
- Jurisdictional Boundaries

Future Development

- Commercial
- County
- Industrial
- PUD
- Residential

Key Plan

FIGURE NO. A-1

TITLE FUTURE DEVELOPMENT DEMANDS

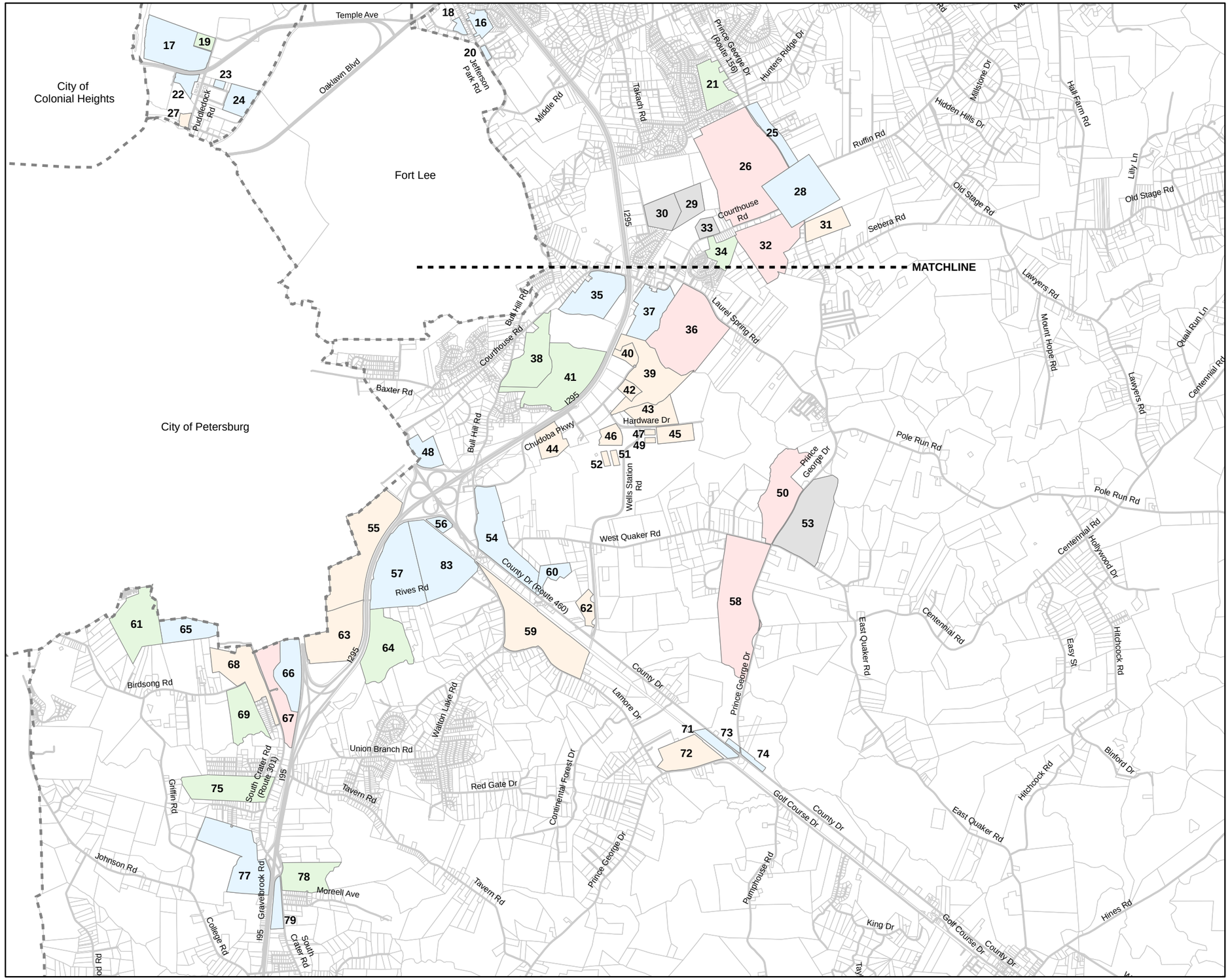
SCALE 1 inch = 5,000 feet

PROJECT WATER & WASTEWATER MASTER PLAN
PRINCE GEORGE COUNTY, VA

DATE 01/2016

PROJ. NO. 50068442

Dewberry
Dewberry Engineers Inc.
4805 LAKE BROOK DRIVE, SUITE 200
GLEN ALLEN, VIRGINIA 23060
PHONE: 804.290.7957
FAX: 804.290.7928



N

W E

S

Legend

- Road Centerlines
- TaxParcels
- Jurisdictional Boundaries

Future Development

- Commercial
- County
- Industrial
- PUD
- Residential

Key Plan

FIGURE NO. A-2

TITLE FUTURE DEVELOPMENT DEMANDS

SCALE 1 inch = 5,000 feet

PROJECT WATER & WASTEWATER MASTER PLAN
PRINCE GEORGE COUNTY, VA

DATE 01/2016

PROJ. NO. 50068442

Dewberry
Dewberry Engineers Inc.
4805 LAKE BROOK DRIVE, SUITE 200
GLEN ALLEN, VIRGINIA 23060
PHONE: 804.290.7957
FAX: 804.290.7928

Water Demand and Sewer Loading Projections

Proposed Commercial Demands

Map ID	Classification	Phase	Total Area (AC)	Percent Developable	Developable Area (AC)	Density Classification	Demand by 2020 (gpd)	Demand by 2025 (gpd)	Demand by 2035 (gpd)	Demand by 2045 (gpd)
4	Commercial	4	153	40%	61	Retail	-	-	-	122,400
6	Commercial	3	59	70%	41	Retail	-	-	82,684	-
7	Commercial	3	78	70%	55	Retail	-	-	109,782	-
8	Commercial	2	11	70%	8	Retail	-	15,962	-	-
10	Commercial	3	164	70%	115	Office	-	-	215,812	-
12	Commercial	2	36	50%	18	Retail	-	35,601	-	-
14	Commercial	3	93	70%	65	Office	-	-	122,420	-
16	Commercial	2	26	70%	18	Retail	-	36,013	-	-
17	Commercial	2	142	70%	99	Retail	-	198,202	-	-
18	Commercial	2	8	70%	5	Retail	-	10,929	-	-
20	Commercial	2	5	70%	3	Retail	-	6,751	-	-
22	Commercial	1	19	70%	13	Big Box	8,568	-	-	-
23	Commercial	1	5	70%	3	Big Box	8,568	-	-	-
24	Commercial	1	43	70%	30	Big Box	8,568	-	-	-
25	Commercial	4	45	70%	31	Retail	-	-	-	62,918
26	PUD	4	381	55%	210	PUD	-	-	-	125,809
28	Commercial	4	173	35%	61	Retail	-	-	-	121,186
29	County	2	48	70%	34	Irrigation	-	35,408	-	-
30	County	1	55	70%	39	Irrigation	44,135	-	-	-
32	PUD	4	148	55%	81	PUD	-	-	-	48,686
33	County	3	21	70%	15	Government	-	-	3,800	-
35	Commercial	3	113	50%	56	Big Box	-	-	8,568	-
36	PUD	4	250	25%	63	PUD	-	-	-	37,501
37	Commercial	3	87	50%	44	Retail	-	-	87,010	-
48	Commercial	2	43	70%	30	Big Box	-	8,568	-	-
50	PUD	2	147	55%	81	PUD	-	48,439	-	-
53	County	2	181	70%	126	Government	-	3,800	-	-
54	Commercial	4	160	70%	112	Restaurant	-	-	-	5,000
55	Industrial	4	215	70%	151	Office/Retail	-	-	-	63,090
56	Commercial	1	14	50%	7	Storage	1,000	-	-	-
57	Commercial	3	191	40%	77	Retail	-	-	153,184	-
58	PUD	2	283	35%	99	PUD	-	59,522	-	-
60	Commercial	4	31	70%	22	Retail	-	-	-	43,580
63	Industrial	4	144	70%	101	Office/Retail	-	-	-	42,750
65	Commercial	2	66	70%	46	Retail	-	60,450	-	-
66	Commercial	1	82	70%	58	Office/Retail	84,630	-	-	-
67	PUD	4	88	55%	48	Office/Retail	-	-	-	60,600
68	Industrial	4	110	70%	77	Office/Retail	-	-	-	65,925
71	Commercial	2	24	50%	12	Retail	-	24,461	-	-
73	Commercial	2	5	50%	2	Retail	-	4,956	-	-
74	Commercial	2	9	50%	5	Retail	-	9,053	-	-
77	Commercial	2	163	70%	114	Route 301	-	26,000	-	-
79	Commercial	4	27	70%	19	Retail	-	-	-	37,697
83	Commercial	4	186	40%	74	Retail	-	-	-	148,815
100	Commercial	1	75	70%	52	Golf Course	25,000	-	-	-
Total Demand							180,469	764,583	1,547,842	2,533,799

Water Demand and Sewer Loading Projections

Proposed Residential Demands

Map ID	Classification	Phase	Total Area (AC)	Percent Developable	Developable Area (AC)	Density Classification	Units	Demand by 2020 (gpd)	Demand by 2025 (gpd)	Demand by 2035 (gpd)	Demand by 2045 (gpd)
1	Residential	1	12	60%	7	Lot Count	64	19,968	-	-	-
2	Residential	3	194	60%	116	R-1	290	-	-	90,615	-
3	Residential	1	38	60%	23	Lot Count	79	24,648	-	-	-
5	Residential	1	114	60%	68	Lot Count	100	31,200	-	-	-
9	Residential	2	179	60%	107	R-1	268	-	83,688	-	-
11	Residential	1	154	45%	69	Lot Count	281	87,672	-	-	-
13	Residential	2	222	60%	133	R-E	133	-	41,616	-	-
19	Residential	1	15	60%	9	Lot Count	132	41,184	-	-	-
21	Residential	2	66	60%	40	Lot Count	102	-	31,824	-	-
26	PUD	4	381	55%	210	PUD	367	-	-	-	114,486
32	PUD	4	148	55%	81	PUD	142	-	-	-	44,304
34	Residential	1	39	60%	24	Lot Count	119	37,128	-	-	-
36	PUD	4	250	25%	63	PUD	109	-	-	-	34,126
38	Residential	2	121	60%	73	R-E	75	-	23,400	-	-
41	Residential	4	188	60%	113	R-E	113	-	-	-	35,141
50	PUD	2	147	55%	81	PUD	141	-	44,080	-	-
58	PUD	2	283	35%	99	PUD	174	-	54,165	-	-
61	Residential	4	135	60%	81	R-1	202	-	-	-	63,140
64	Residential	4	140	60%	84	R-1	210	-	-	-	65,417
67	PUD	4	88	55%	48	-	-	-	-	-	48,000
69	Residential	4	85	60%	51	R-1	128	-	-	-	39,876
75	Residential	3	123	60%	74	R-1	185	-	-	57,733	-
78	Residential	4	81	60%	49	R-1	122	-	-	-	37,993
Total Demand							3,537	241,800	520,573	668,921	1,151,406

Proposed Industrial Demands

Map ID	Classification	Phase	Total Area (AC)	Percent Developable	Developable Area (AC)	Density Classification	Demand by 2020 (gpd)	Demand by 2025 (gpd)	Demand by 2035 (gpd)	Demand by 2045 (gpd)
27	Industrial	1	8	70%	6	Light	11,538	-	-	-
31	Industrial	4	50	70%	35	Light	-	-	-	70,476
39	Industrial	1	142	70%	99	Heavy	596,922	-	-	-
40	Industrial	1	20	70%	14	Heavy	83,365	-	-	-
42	Industrial	1	15	70%	11	Heavy	64,636	-	-	-
43	Industrial	1	60	70%	42	Heavy	251,451	-	-	-
44	Industrial	1	46	70%	32	Distribution	32,050	-	-	-
45	Industrial	2	36	70%	25	Light	-	50,522	-	-
46	Industrial	1	24	70%	17	Heavy	99,263	-	-	-
47	Industrial	1	3	70%	2	Distribution	11,250	-	-	-
49	Industrial	1	3	70%	2	Distribution	11,250	-	-	-
51	Industrial	1	6	70%	4	Distribution	15,000	-	-	-
52	Industrial	1	5	70%	4	Distribution	15,000	-	-	-
55	Industrial	4	215	70%	151	Distribution/Warehouse	-	-	-	91,910
59	Industrial	2	223	70%	156	Distribution	-	7,500	-	-
62	Industrial	2	24	70%	17	Light	-	33,857	-	-
63	Industrial	4	144	70%	101	Distribution/Warehouse	-	-	-	82,830
68	Industrial	4	110	70%	77	Distribution/Warehouse	-	-	-	38,880
72	Industrial	2	85	70%	59	Distribution	-	59,179	-	-
Total Demand							1,191,726	1,342,785	1,342,785	1,626,880

Appendix B:
Water and Wastewater Facility Condition Assessments

www.dewberry.com

Water and Wastewater Master Plan
Prince George County, Virginia

Dewberry

TECHNICAL MEMORANDUM

Date: December 5, 2014

To: Chip England, P.E.

From: Dan Villhauer, PE

Subject: Prince George County Water and Wastewater Facilities Condition Assessment
Wastewater Pump Stations

BACKGROUND

Prince George County (County) owns and operates a total of twenty-four (24) wastewater pump stations throughout the wastewater service area. Dewberry was tasked to work with County staff to complete a general condition assessment of the pump stations and provide a budget cost estimate for the recommended improvements. The following tasks were completed to develop these budget-level cost estimates:

- Conducted site visits to the respective facilities to review existing conditions and proposed upgrades;
- Contacted suppliers, manufacturers, and manufacturers' representatives to obtain budget pricing for major equipment components;
- Reviewed contractor pricing and bid information from previous similar projects;
- Developed independent budget-level construction cost estimates for each facility

The following represents an overview of the condition assessment of each facility, associated budget cost estimates, and recommended prioritization for each evaluated maintenance/upgrade alternative.

WASTEWATER PUMP STATION EVALUATION

The following includes a summary of each pump station with listed deficiencies, recommended corrective actions, and a budget cost estimate. Deficiencies for each pump station were divided into two categories: critical and secondary. It should be noted that drawdown testing for each of the pumps was not included in the analysis but should be completed by the County to verify that the pumps are operating on the pump performance curve.

Pump Station No. 1 (Bank of Southside VA)

This pump station includes a duplex 4-inch Gorman Rupp suction lift pump skid with a propane backup engine driven pump housed in a precast concrete building. The wet well is located next to the pump building. Based on available records, the pump station was upgraded to include the Gorman Rupp pumps and building in 1998. The following deficiencies were noted during the site visit:

Critical Deficiencies:

1. *Deficiency:* Inadequate ventilation for backup engine drive pump. County staff indicated that the room overheated during operation of the backup pump.
   Action: Install louvers on existing building wall to allow for adequate ventilation during running of the backup engine drive pump.

2. *Deficiency:* Pump skid not grouted solid causing vibration during pump operation.
   Action: Grout pump skid.

3. *Deficiency:* Control panel lights broken.
   Action: Replace broken lights and perform general control panel rehabilitation.

4. *Deficiency:* No remote monitoring or alarm annunciation.
   Action: Install wireless remote monitoring equipment.

5. *Deficiency:* No generator and ATS
   Action: County staff indicated a generator and ATS installation is planned for this pump station therefore no further action is required for this item.

6. *Deficiency:* Wet well top is in poor condition and has multiple unsecured openings including a CMU block covering one opening. Wet well vent is not screened.
   Action: Replace the wet well top with a new precast concrete top to include a rectangular

Secondary Deficiencies:

7. *Deficiency:* Pressure gauges inoperable.
   Action: Replace pressure gauges.

8. *Deficiency:* Flow meter measures flow based on pump run time which is not accurate when pump is running but not pumping flow (i.e. during priming)
   Action: Install magnetic flow meter on common discharge pipe and replace elbow with a tee and sewage combination air valve.

9. *Deficiency:* Poor condition of paint on piping and equipment.
   Action: Paint piping and equipment.

10. *Deficiency:* Suction and discharge emergency pump connections do not have quick connect fittings.
    Action: Install quick connect with cap and chain on suction and discharge connections. Include elbow at each connection to orient the connections horizontally.

11. *Deficiency:* No site lighting.
    Action: Install new outdoor light on new pole with concrete base.

Pump Station No. 2 (Whispering Winds)

This pump station includes a separate wet well and dry pit with two 4-foot diameter manholes. Two dry-pit pumps and valves are located at the bottom of the dry pit which is accessible with a ladder. Based on available records, the pump station was constructed in the 1970s with the pumps and control panel being replaced in the late 1990s. The following deficiencies were noted during the site visit:

Critical Deficiencies:

1. *Deficiency:* Access to the pumps and valves is difficult and requires confined space entry into a dry well that is approximately 20 feet deep.
   Action: It is recommended that the pump station be replaced with a duplex Gorman Rupp suction lift pump station that will generally include the following features:
   a. Duplex Gorman Rupp Pump Skid
   b. Precast concrete building
   c. Emergency generator with ATS
   d. Remote wireless monitoring
   e. New wet well top with aluminum hatch and safety grating
   f. New drop pipe in wet well

Secondary Deficiencies:

2. *Deficiency:* Flow meter measures flow based on pump run time which is not accurate when pump is running but not pumping flow (i.e. during priming).
   Action: Install magnetic flow meter on common discharge pipe and replace elbow with a tee and sewage combination air valve.

3. *Deficiency:* Suction and discharge emergency pump connections do not have quick connect fittings.
   Action: Install quick connect with cap and chain on suction and discharge connections. Include elbow at each connection to orient the connections horizontally.

4. *Deficiency:* No security around site
   Action: Install fence and gate

5. *Deficiency:* No site lighting.
   Action: Install new outdoor light on new pole with concrete base.

Pump Station No. 3 (Country Aire)
This pump station includes a duplex 4-inch Gorman Rupp suction lift pump skid housed in a precast concrete building. Half of the wet well is located under the pump building. Based on available records, the pump station was upgraded to include the Gorman Rupp pumps and building in late 1990's. The following deficiencies were noted during the site visit:

Critical Deficiencies:

1. *Deficiency:* Check valves slam
   Action: Install levers and weights or springs on check valves. Adjust as required to prevent slamming.

2. *Deficiency:* Control panel lights broken.
   Action: Replace broken lights and perform general control panel rehabilitation.

3. *Deficiency:* No remote monitoring or alarm annunciation.
   Action: Install wireless remote monitoring equipment.

4. *Deficiency:* No generator and ATS
   Action: Install emergency generator and ATS

5. *Deficiency:* Wet well top is in poor condition and has multiple unsecured openings including a CMU block covering one opening. Wet well vent is not screened.
   Action: Replace the wet well top with a new precast concrete top to include a rectangular aluminum access hatch, screened vent, and emergency pumping suction drop pipe.

Secondary Deficiencies:

6. *Deficiency:* Pressure gauges inoperable.
   Action: Replace pressure gauges.

7. *Deficiency:* Flow meter measures flow based on pump run time which is not accurate when pump is running but not pumping flow (i.e. during priming)
   Action: Install magnetic flow meter on common discharge pipe and replace elbow with a tee and sewage combination air valve.

8. *Deficiency:* Poor condition of paint on piping and equipment.
   Action: Paint piping and equipment.

9. *Deficiency:* Suction and discharge emergency pump connections do not have quick connect fittings.
   Action: Install quick connect with cap and chain on suction and discharge connections. Include elbow at each connection to orient the connections horizontally.

10. *Deficiency:* No site lighting.
    Action: Install new outdoor light on new pole with concrete base.

11. *Deficiency:* Galvanized rusted pipe on pump air vent piping.
    Action: Replace galvanized pipe with stainless steel.

12. *Deficiency:* Building intake louver damper not operating.
    Action: Install new damper motor.

13. *Deficiency:* Building lighting poor.
    Action: Install new fluorescent fixtures.

14. *Deficiency:* Doors in poor condition.
    Action: Install and paint new doors.

15. *Deficiency:* Building dampers are not protected from the weather.
    Action: Install stainless steel rain hoods over louvers.

16. *Deficiency:* Wet well has large accumulations of grease.
    Action: Install mixer in wet well to break up grease and allow it to be pumped.

17. *Deficiency:* Floor drain piping exits side of building and opening is blocked with stones.
    Action: Repair pipe and install screen on discharge.

18. *Deficiency:* Fence damaged compromising site security
    Action: Repair fence

Pump Station No. 4 (Pine Ridge)

This pump station includes a duplex 4-inch Gorman Rupp suction lift pump skid housed in a precast concrete building. Half of the wet well is located under the pump building. Based on available records, the pump station was upgraded to include the Gorman Rupp pumps and building in 1996. The following deficiencies were noted during the site visit:

Critical Deficiencies:

1. *Deficiency:* Pump skid not grouted solid causing vibration during pump operation.
   Action: Grout pump skid.

2. *Deficiency:* Control panel lights broken.
   Action: Replace broken lights and perform general control panel rehabilitation.

3. *Deficiency:* No remote monitoring or alarm annunciation.
   Action: Install wireless remote monitoring equipment.

4. *Deficiency:* Wet well top is in poor condition and has multiple unsecured openings including a CMU block covering one opening. Wet well vent is not screened.
   Action: Replace the wet well top with a new precast concrete top to include a rectangular aluminum access hatch, screened vent, and emergency pumping suction drop pipe.

5. *Deficiency:* Building overheats when emergency backup engine is running.
   Action: Install special intake and exhaust louvers for interior building cooling.

Secondary Deficiencies:

6. *Deficiency:* Pressure gauges inoperable.
   Action: Replace pressure gauges.

7. *Deficiency:* Flow meter measures flow based on pump run time which is not accurate when pump is running but not pumping flow (i.e. during priming)
   Action: Install magnetic flow meter on common discharge pipe and replace elbow with a tee and sewage combination air valve.

8. *Deficiency:* Poor condition of paint on piping and equipment.
   Action: Paint piping and equipment.

9. *Deficiency:* Suction and discharge emergency pump connections do not have quick connect fittings.
   Action: Install quick connect with cap and chain on suction and discharge connections. Include elbow at each connection to orient the connections horizontally.

10. *Deficiency:* No site lighting.
    Action: Install new outdoor light on new pole with concrete base.

11. *Deficiency:* Engine exhaust pipe opening in building wall not sealed.
    Action: Seal opening.

12. *Deficiency:* Building lighting poor.
    Action: Install new fluorescent fixtures.

13. *Deficiency:* Doors in poor condition.
    Action: Install and paint new doors.

14. *Deficiency:* Building dampers are not protected from the weather.
    Action: Install stainless steel rain hoods over louvers.

15. *Deficiency:* Wet well has large accumulations of grease.
    Action: Install mixer in wet well to break up grease and allow it to be pumped.

16. *Deficiency:* No light over building door.

Action: Install lights over building door.

17. *Deficiency:* No security around site
Action: Install fence and gate

18. *Deficiency:* Pump preventative maintenance
Action: Install new rotating assembly, wear plates and suction disk.

Pump Station No. 5 (Route 36)
This pump station includes a wet well with two 5 hp submersible pumps discharging through an underground valve vault to the force main. The wet well and valve vault are located in a highway median. Based on available records, the pump station was installed in 1976. The following deficiencies were noted during the site visit:

Critical Deficiencies:

1. *Deficiency:* Wet well and valve vault are located in a highway median creating an unsafe condition for access and maintenance.
Action: Install a new pump station in another location. The new pump station shall consist of the following components:
   a. New wet well
   b. New building
   c. New suction lift pumps, valves and piping in the building
   d. Emergency Generator
   e. Magnetic flow meter
   f. Remote annunciation
   g. Suction Drop pipe
   h. New gravity piping from existing wet well to new wet well
   i. Jack and bore casing pipe to cross highway.
   j. New manholes for gravity pipe
   k. Site piping to connect pump discharge to force main.
   l. New electric service
   m. Security fence and gate
   n. Site lighting
   o. Conduit and wiring

Note: The cost estimate for these pump station improvements is only for the equipment and construction costs to relocate pump station. This estimate does not include costs for property acquisition, easements, permits, property plates, survey, legal fees and any other required expenses as required to relocate pump station. The estimate is based upon the new pump station being located within approximately 300 ft from the existing pump station. A detailed study would be required to identify the exact location of the relocated pump station and associated budget costs.

Pump Station No. 6 (Route 301)
This pump station includes a duplex 4-inch Smith and Loveless suction lift pump skid housed in a block and brick building. The pumps are located in a lower level of the building which is the top of the wet well. The ground level of the building consists of metal grating walk ways around one half of the inside perimeter of the building.

Based on available records, the pump station was upgraded to include the Gorman Rupp pumps and building in 1979. The following deficiencies were noted during the site visit:

Critical Deficiencies:

1. *Deficiency:* The pump station has many code violations, is in poor condition, provides limited access to the pumps and is not a safe environment to work in due to the wet well gases in the building.
   Action: Replace the pump station with a new station consisting of the following:
   a. Demolition of the existing building and all the electrical and mechanical equipment, valves and piping.
   b. Cleaning of wet well
   c. Slab over the existing concrete structure with hatch safety grating, vent and drop pipe.
   d. Pre-cast building over a portion of the slab to provide pump suction lines access to the wet well.
   e. T6 Gorman Rupp suction lift pumps installed in the building
   f. Valves and piping
   g. Magnetic flow meter
   h. Mixer in wet well
   i. Deck around existing generator
   j. Remote annunciation
   k. Site lighting
   l. Conduit and wiring
   m. Relocation of electric service

Pump Station No. 7 (Johnson Road)
This pump station includes a Smith and Loveless 4-inch duplex suction lift pump skid housed in a fiberglass hut located over the wet well.

Based on available records, the pump station was constructed in 1981. The following deficiencies were noted during the site visit:

Critical Deficiencies:

1. *Deficiency:* No remote monitoring or alarm annunciation.
   Action: Install wireless remote monitoring equipment.

2. *Deficiency:* No generator and ATS
   Action: Install emergency generator and ATS

3. *Deficiency:* Fence damaged compromising site security
   Action: Repair fence

Secondary Deficiencies:

4. *Deficiency:* Pump station in poor condition. Pumps are located on a steel base plate which services as the wet well top. The steel has deaerated to a point which would require replacing. Pump bases, flange bolts require replacing. Pump control panels are rusty.
   Action: Replace pumps with Gorman Rupp T4 suction lift pumps in a new building consisting of the following:

   a. Demolition of the existing pumps valves, piping and electric service
   b. Cleaning of wet well
   c. Pre-cast wet well cover with hatch, safety grating, vent and drop pipe
   d. Pre-cast building over a portion of the wet well cover to provide pump suction lines access to the wet well.
   e. T4 Gorman Rupp suction lift pumps installed in the building
   f. Pump suction pipe
   g. Pump discharge pipe to force main
   h. Emergency suction drop pipe with quick connections
   i. Magnetic flow meter
   j. Site lighting
   k. Conduit and wiring

5. *Deficiency:* Discharge emergency pump connection does not have quick connect fitting.
   Action: Install quick connect with cap and chain on discharge connection. Include elbow at connection to orient the connection horizontally.

6. *Deficiency:* No site lighting.
   Action: Install new outdoor light on new pole with concrete base.

Pump Station No. 8 (Wildwood Farms)
This pump station includes a Smith and Loveless 4-inch duplex suction lift pump skid housed in a fiberglass hut located over the wet well.

Based on available records, the pump station was installed in 1981. The following deficiencies were noted during the site visit:

Critical Deficiencies:

1. *Deficiency:* No remote monitoring or alarm annunciation.
   Action: Install wireless remote monitoring equipment.

2. *Deficiency:* No generator and ATS
   Action: Install emergency generator and ATS

3. *Deficiency:* Fence damaged compromising site security
   Action: Install new fence

Secondary Deficiencies:

4. *Deficiency:* Pump station in poor condition. Pumps are located on a steel base plate which services as the wet well top. The steel has deaerated to a point which would require replacing. Pump bases, flange bolts require replacing. Pump control panels are rusty.
   Action: Replace pumps with Gorman Rupp T4 suction lift pumps in a new building consisting of the following:

   a. Demolition of the existing pumps valves, piping and electric service
   b. Cleaning of wet well
   c. Pre-cast wet well cover with hatch, safety grating, vent and drop pipe
   d. Pre-cast building over a portion of the wet well cover to provide pump suction lines access to the wet well.
   e. T4 Gorman Rupp suction lift pumps installed in the building
   f. Pump suction pipe
   g. Pump discharge pipe to force main
   h. Emergency suction drop pipe with quick connections
   i. Magnetic flow meter
   j. Site lighting
   k. Conduit and wiring

5. *Deficiency:* Discharge emergency pump connection does not have quick connect fitting.
   Action: Install quick connect with cap and chain on discharge connection. Include elbow at connection to orient the connection horizontally.

6. *Deficiency:* No site lighting.
   Action: Install new outdoor light on new pole with concrete base.

7. *Deficiency:* Electrical panel board rusty
   Action: Sandblast and paint

Pump Station No. 9 (Route 460/Jail)
This pump station includes a Fairbanks Morse 4-inch duplex suction lift pump skid housed in a fiberglass hut located over the wet well.

Based on available records, the pump station was constructed in 1982. The following deficiencies were noted during the site visit:

Critical Deficiencies:

1. *Deficiency:* No remote monitoring or alarm annunciation.
   Action: Install wireless remote monitoring equipment.

2. *Deficiency:* No generator and ATS
   Action: Install emergency generator and ATS

3. *Deficiency:* Fence damaged compromising site security
   Action: Install new fence

Secondary Deficiencies:

4. *Deficiency:* Pump station in poor condition. Pumps are located on a steel base plate which services as the wet well top. The steel has deaerated to a point which would require replacing. Pump bases, flange bolts require replacing. Pump control panels are rusty.
   Action: Replace pumps with Gorman Rupp T6 suction lift pumps in a new building consisting of the following:

   a. Demolition of the existing pumps valves, piping and electric service
   b. Cleaning of wet well
   c. Pre-cast wet well cover with hatch, safety grating, vent and drop pipe
   d. Pre-cast building over a portion of the wet well cover to provide pump suction lines access to the wet well.
   e. T6 Gorman Rupp suction lift pumps installed in the building
   f. Pump suction pipe
   g. Pump discharge pipe to force main
   h. Emergency suction drop pipe with quick connections
   i. Magnetic flow meter
   j. Conduit and wiring

5. *Deficiency:* Discharge emergency pump connection does not have quick connect fitting.
   Action: Install quick connect with cap and chain on discharge connection. Include elbow at connection to orient the connection horizontally.

6. *Deficiency:* No site lighting.
   Action: Install new outdoor light on new pole with concrete base.

7. *Deficiency:* Fence overgrown with vegetation
   Action: Clear around fence

Pump Station No. 10 (Route 460/Food Lion)
This pump station includes a Smith and Loveless 4-inch duplex suction lift pump skid housed in a fiberglass hut located over the wet well.

Based on available records, the pump station was installed in 1982. The following deficiencies were noted during the site visit:

Critical Deficiencies:

1. *Deficiency:* No remote monitoring or alarm annunciation.
   Action: Install wireless remote monitoring equipment.

2. *Deficiency:* No generator and ATS
   Action: Install emergency generator and ATS

3. *Deficiency:* Fence damaged compromising site security
   Action: Install new fence

Secondary Deficiencies:

4. *Deficiency:* Pump station is in fair condition. Pumps are located on a steel base plate located on top of a concrete wet well cover. Wet well exhaust fan does not operate. Pump station replacement at this time is not necessary.
   Action: Should replacement be required in the future it is suggested the pumps be replaced with Gorman Rupp T4 suction lift pumps in a new building consisting of the following:

   a. Demolition of the existing pumps valves, piping and electric service
   b. Cleaning of wet well
   c. Pre-cast wet well cover with hatch, safety grating, vent and drop pipe
   d. Pre-cast building over a portion of the wet well cover to provide pump suction lines access to the wet well.
   e. T4 Gorman Rupp suction lift pumps installed in the building
   f. Pump suction pipe
   g. Pump discharge pipe to force main
   h. Emergency suction drop pipe with quick connections
   i. Magnetic flow meter
   j. Conduit and wiring

5. *Deficiency:* Discharge emergency pump connection does not have quick connect fitting.
   Action: Install quick connect with cap and chain on discharge connection. Include elbow at connection to orient the connection horizontally.

6. *Deficiency:* No site lighting.
   Action: Install new outdoor light on new pole with concrete base.

7. *Deficiency:* Fence overgrown with vegetation
   Action: Clear around fence

Pump Station No. 11 (Beechwood Manor)
This pump station includes two submersible pumps in a round concrete wet well. The wet well top is approximately 6'-6" above grade because it is located in a flood plain. The wet well top is steel with a ladder for access and a hand rail around the top.

Based on available records, the pump station was constructed in 1980's. The following deficiencies were noted during the site visit:

Critical Deficiencies:

1. *Deficiency:* Handrail and ladder to top of wet well is not code compliant. Wet well top is steel.
   Action: Install a new concrete wet well top with hatch and safety grating. Install code compliant stairs to top of wet well with code compliant handrail around the top. Include portable hoist for pump removal and new emergency suction drop pipe.

2. *Deficiency:* No remote monitoring or alarm annunciation.
   Action: Install wireless remote monitoring equipment.

3. *Deficiency:* No generator and ATS
   Action: Install emergency generator, fuel tank and ATS on concrete piers to elevate above flood plain. Install stairs and platform with handrails for equipment access.

Secondary Deficiencies:

4. *Deficiency:* Submersible pumps require replacement
   Action: Install new submersible pumps, guiderails, and discharge piping. Due to the wetwell top height above finished grade it is impractical to install a Gorman Rupp pump station and building.

5. *Deficiency:* Valve vault and valves are in bad condition.
   Action: Replace valve vault, valves and piping.

6. *Deficiency:* All the electrical panels are below the flood plane
   Action: Remove all existing electrical panels. Install electric panel board on concrete piers to elevate above the flood plain. Install stairs and platform with handrails for panel access. Install new NEMA 4X panels. Install new underground electrical service from power pole to new electrical panels on platform
7. *Deficiency:* Flow meter measures flow based on pump run time which is not accurate when pump is running but not pumping flow (i.e. during priming)
   Action: Install magnetic flow meter in manhole with emergency pump connection and appropriate valves.

8. *Deficiency:* No site lighting.
   Action: Install new outdoor light on new pole with concrete base.

Pump Station No. 12 (Crossings Blvd.)
This pump station includes a Smith and Loveless 4-inch duplex suction lift pump skid housed in a steel enclosure approximately 5 feet deep. The bottom of enclosure is at the top of the wet well

Based on available records, the pump station was constructed in the 1980's. The following deficiencies were noted during the site visit:

Critical Deficiencies:

1. *Deficiency:* No remote monitoring or alarm annunciation.
   Action: Install wireless remote monitoring equipment.

2. *Deficiency:* No generator and ATS
   Action: Install emergency generator and ATS

3. *Deficiency:* Fence damaged compromising site security
   Action: Repair fence

Secondary Deficiencies:

4. *Deficiency:* Pump station in poor condition. Pumps are located in a steel enclosure approximately 5 feet deep and is considered a confined space. The steel enclosure and pump bases are rusty. The pump control panel is located in the enclosure and is in poor condition.
   Action: Replace pumps with Gorman Rupp T4 suction lift pumps in a new building consisting of the following:

   a. Demolition of the existing pumps valves, piping and electric service
   b. Cleaning of wet well
   c. 6 foot high pre-cast section to the wet well to bring up to grade
   d. Pre-cast wet well cover with hatch, safety grating, vent and drop pipe
   e. Pre-cast building over a portion of the wet well cover to provide pump suction lines access to the wet well.
   f. T4 Gorman Rupp suction lift pumps installed in the building
   g. Pump suction pipe
   h. Pump discharge pipe to force main
   i. Emergency suction drop pipe with quick connections
   j. Magnetic flow meter
   k. Conduit and wiring

5. *Deficiency:* Discharge emergency pump connection does not have quick connect fitting.
   Action: Install quick connect with cap and chain on discharge connection. Include elbow at connection to orient the connection horizontally.

6. *Deficiency:* No site lighting.
   Action: Install new outdoor light on new pole with concrete base.

Pump Station No. 13 (Bull Hill Road)

This pump station includes a Smith and Loveless 4-inch duplex suction lift pump skid housed in a steel enclosure approximately 5 feet deep. The bottom of enclosure is at the top of the wet well

Based on available records, the pump station was constructed in 1985. The following deficiencies were noted during the site visit:

Critical Deficiencies:

1. *Deficiency:* No remote monitoring or alarm annunciation.
   Action: Install wireless remote monitoring equipment.

2. *Deficiency:* No generator and ATS
   Action: Install emergency generator and ATS.

3. *Deficiency:* Fence damaged compromising site security
   Action: Repair fence

Secondary Deficiencies:

4. *Deficiency:* Pump station in poor condition. Pumps are located in a steel enclosure approximately 5 feet deep and is considered a confined space. The steel enclosure and pump bases are rusty. The pump control panel is located in the enclosure and is in poor condition.
   Action: Replace pumps with Gorman Rupp T4 suction lift pumps in a new building consisting of the following:

   l. Demolition of the existing pumps valves, piping and electric service
   m. Cleaning of wet well
   n. 6 foot high pre-cast section to the wet well to bring up to grade
   o. Pre-cast wet well cover with hatch, safety grating, vent and drop pipe
   p. Pre-cast building over a portion of the wet well cover to provide pump suction lines access to the wet well.
   q. T4 Gorman Rupp suction lift pumps installed in the building
   r. Pump suction pipe
   s. Pump discharge pipe to force main
   t. Emergency suction drop pipe with quick connections
   u. Magnetic flow meter
   v. Conduit and wiring

5. *Deficiency:* Discharge emergency pump connection does not have quick connect fitting.
   Action: Install quick connect with cap and chain on discharge connection. Include elbow at connection to orient the connection horizontally.

6. *Deficiency:* No site lighting.
   Action: Install new outdoor light on new pole with concrete base.

Pump Station No. 14 (Puddleduck Area)
This pump station includes duplex 5 hp submersible grinder pumps in the wet well. The electric panels are located adjacent to the wet well on a panel board with a shingled roof.

Based on available records, the pump station was constructed in 1986. The following deficiencies were noted during the site visit:

Critical Deficiencies:

1. *Deficiency:* Grinder pumps clog up due to rags in the system. Junction box on wet well top is not code compliant.
   Action: Replace grinder pumps with Gorman Rupp T4 suction lift pumps and a new pre-cast building consisting of the following:

   a. Demolition of the existing pumps valves, piping and electric service
   b. Cleaning of wet well
   c. Pre-cast wet well cover with hatch, safety grating, vent and drop pipe
   d. Pre-cast building over a portion of the wet well cover to provide pump suction lines access to the wet well.
   e. T4 Gorman Rupp suction lift pumps installed in the building
   f. Pump suction pipe
   g. Pump discharge pipe to force main
   h. Emergency suction drop pipe with quick connections

i. Magnetic flow meter
j. Conduit and wiring
k. Relocate all electrical panel boards to inside building

2. *Deficiency:* No remote monitoring or alarm annunciation.
   Action: Install wireless remote monitoring equipment.

3. *Deficiency:* No generator and ATS
   Action: Install emergency generator and ATS.

Secondary Deficiencies:

4. *Deficiency:* Discharge emergency pump connection does not have cap on quick connect fitting.
   Action: Install quick connect cap

5. *Deficiency:* No site lighting.
   Action: Install new outdoor light on new pole with concrete base.

Pump Station No. 15 (Route 460/156)
This pump station includes a duplex 4-inch Gorman Rupp suction lift pump skid housed in a fiberglass hutch. The pumps and hutch are located over the wet well.

Based on available records, the pump station was constructed in 1989. The following deficiencies were noted during the site visit:

Critical Deficiencies:

1. *Deficiency:* No remote monitoring or alarm annunciation.
   Action: Install wireless remote monitoring equipment.

2. *Deficiency:* Site does not have emergency pump connection
   Action: Install emergency pump connection

3. *Deficiency:* No generator and ATS
   Action: Install emergency generator and ATS.

Secondary Deficiencies:

4. *Deficiency:* Pumps, piping and electrical controls are in poor condition. The equipment in the confines of the hutch makes maintenance very difficult.
   Action: Replace the existing pumps with Gorman Rupp T4 suction lift pumps and a new pre-cast building consisting of the following:

a. Demolition of the existing pumps valves, piping and electric service
b. Cleaning of wet well
c. Pre-cast wet well cover with hatch, safety grating, vent and drop pipe
d. Pre-cast building over a portion of the wet well cover to provide pump suction lines access to the wet well.
e. T4 Gorman Rupp suction lift pumps installed in the building
f. Pump suction pipe

g. Pump discharge pipe to force main
h. Emergency suction drop pipe with quick connections
i. Magnetic flow meter
j. Conduit and wiring
k. Relocate all electrical panel boards to inside building

5. *Deficiency:* No site lighting.
   Action: Install new outdoor light on new pole with concrete base.

6. *Deficiency:* Fence damaged compromising site security
   Action: Repair fence

7. *Deficiency:* Fence overgrown with vegetation
   Action: Clear around fence

Pump Station No. 16 (Cedar wood)
This pump station includes a duplex 4-inch Smith and Loveless suction lift pump skid housed in a pre-cast concrete building. The pump skid base is the top of the wet well.

Based on available records, the pump station was constructed in 1989 with the precast building being added at a later date. The following deficiencies were noted during the site visit:

Critical Deficiencies:

1. *Deficiency:* The access hatch to the wet well is located in the building making the building and all the equipment contained inside (pumps, electric panels, piping, lights, etc) exposed to sewer gas. This by code makes the building an explosion proof area unless ventilated with 12 air changes an hour constantly.
   Action: Replace the wet well top with a new pre-cast concrete top and install a new pre-cast building locating the access hatch outside of the building enclosure. Install new Gorman Rupp suction lift pumps in the new building to include the following:

   a. Demolition of the existing pumps valves, piping and electric service
   b. Cleaning of wet well
   c. Pre-cast wet well cover with hatch, safety grating, vent and drop pipe
   d. Pre-cast building over a portion of the wet well cover to provide pump suction lines access to the wet well.
   e. T4 Gorman Rupp suction lift pumps installed in the building
   f. Pump suction pipe
   g. Pump discharge pipe to force main
   h. Emergency suction drop pipe with quick connections
   i. Magnetic flow meter
   j. Conduit and wiring
   k. Relocate all electrical panel boards to new building

2. *Deficiency:* No remote monitoring or alarm annunciation.
   Action: Install wireless remote monitoring equipment.

3. *Deficiency:* No generator and ATS

Action: Install emergency generator and ATS.

4. *Deficiency:* Fence damaged compromising site security
   Action: Repair fence

Secondary Deficiencies:

5. *Deficiency:* Discharge emergency pump connection does not have quick connect fitting.
   Action: Install quick connect with cap and chain on discharge connection.

6. *Deficiency:* No site lighting.
   Action: Install new outdoor light on new pole with concrete base.

Pump Station No. 17 (Jordan on the James)
This pump station includes a two Gorman Rupp series suction lift pump skids housed in a stick built building.

Based on available records, the pump station was constructed 1989 with the building being added at a later date. The following deficiencies were noted during the site visit:

Critical Deficiencies:

1. *Deficiency:* The access hatch to the wet well is located in the building making the building and all the equipment contained inside (pumps, electric panels, piping, lights, etc) exposed to sewer gas. This by code makes the building an explosion proof area unless ventilated with 12 air changes an hour constantly. The stick built enclosure is in need of repair. Existing dampers require repair. Piping and electrical equipment in the building are in poor condition due to exposure to sewer gas. Electrical equipment is not explosion proof.

   Action: Replace the wet well top with a new pre-cast concrete top and install a new pre-cast building locating the access hatch outside of the building enclosure. Install new Gorman Rupp duplex ultra V series suction lift pumps in the new building to include the following:

   a. Demolition of the existing pumps valves, piping and electric service
   b. Cleaning of wet well
   c. Pre-cast wet well cover with hatch, safety grating, vent and drop pipe
   d. Pre-cast building over a portion of the wet well cover to provide pump suction lines access to the wet well.
   e. Gorman Rupp duplex ultra V series suction lift pumps.
   f. New Suction piping
   g. Pump discharge pipe to force main
   h. Emergency suction drop pipe with quick connections
   i. Magnetic flow meter
   j. Conduit and wiring
   k. Relocate all electrical panel boards to new building

2. *Deficiency:* No remote monitoring or alarm annunciation.
   Action: Install wireless remote monitoring equipment.

3. *Deficiency:* No generator and ATS dedicated to the pump station.
   Action: Install emergency generator and ATS dedicated to the pump station.

4. *Deficiency:* No emergency pump connection
   Action: Install emergency pump connection

Secondary Deficiencies:

1. *Deficiency:* No site lighting.
   Action: Install new outdoor light on new pole with concrete base.

Pump Station No. 18 (Branchester Section 12)
This pump station includes a duplex 4-inch Gorman Rupp suction lift pump skid housed in a pre-cast concrete building. The building covers half of the wet well with a manhole outside the building for access to the wet well. A propane powered engine in the building provides pump backup.

Based on available records, the pump station was constructed in 1995. The following deficiencies were noted during the site visit:

Critical Deficiencies:

1. *Deficiency:* Pump skid not grouted solid causing vibration during pump operation.
   Action: Grout pump skid.

2. *Deficiency:* No remote monitoring or alarm annunciation.
   Action: Install wireless remote monitoring equipment.

3. *Deficiency:* No emergency pump suction drop pipe.
   Action: Install emergency pump suction drop pipe.

4. *Deficiency:* No screen on wet well vent.
   Action: Install screen on wet well vent.

5. *Deficiency:* Building overheats when emergency backup engine is running.
   Action: Install special intake and exhaust louvers for interior building cooling.

Secondary Deficiencies:

6. *Deficiency:* Flow meter measures flow based on pump run time which is not accurate when pump is running but not pumping flow (i.e. during priming)
   Action: Install magnetic flow meter on common discharge pipe and replace elbow with a tee and sewage combination air valve.

7. *Deficiency:* Poor condition of paint on piping and equipment.
   Action: Paint piping and equipment.

8. *Deficiency:* Discharge emergency pump connection does not have quick connect fitting.
   Action: Install quick connect with cap and chain on discharge connection. Include elbow at each connection to orient the connections horizontally.

9. *Deficiency:* No site lighting.
   Action: Install new outdoor light on new pole with concrete base.

10. *Deficiency:* No light over building door.
    Action: Install lights over building door.

11. *Deficiency:* Building lighting poor.
    Action: Install new fluorescent fixtures.

12. *Deficiency:* Doors in poor condition.
    Action: Install and paint new doors.

13. *Deficiency:* Building dampers are not protected from the weather.
    Action: Install stainless steel rain hoods over louvers.

14. *Deficiency:* Pump preventative maintenance
    Action: Install new rotating assembly, wear plates and suction disk. Recondition control panel. Install new gages as required.
15. *Deficiency:* Site drainage depression at drainage pipe inlet in the pavement is a safety hazard.
    Action: Install catch basin.

Pump Station No. 19 (Baxter Ridge)
This pump station includes a duplex 4-inch Gorman Rupp suction lift pump skid housed in a pre-cast concrete building. The building covers half of the wet well with a manhole outside the building for access to the wet well. A propane powered engine in the building provides pump backup.

Based on available records, the pump station was constructed in 1996. The following deficiencies were noted during the site visit:

Critical Deficiencies:

1. *Deficiency:* Pump skid not grouted solid causing vibration during pump operation.
   Action: Grout pump skid.

2. *Deficiency:* No remote monitoring or alarm annunciation.
   Action: Install wireless remote monitoring equipment.

3. *Deficiency:* No vent on wet well.
   Action: Install vent

4. *Deficiency:* Building overheats when emergency backup engine is running.
   Action: Install special intake and exhaust louvers for interior building cooling.

Secondary Deficiencies:

5. *Deficiency:* Pressure gauges.
   Action: Pressure gauges may to work; check and replace as required.

6. *Deficiency:* Flow meter measures flow based on pump run time which is not accurate when pump is running but not pumping flow (i.e. during priming)

Action: Install magnetic flow meter on common discharge pipe and replace elbow with a tee and sewage combination air valve.

7. *Deficiency:* Poor condition of paint on piping and equipment.
   Action: Paint piping and equipment.

8. *Deficiency:* Suction and discharge emergency pump connections do not have quick connect fittings.
   Action: Install quick connect with cap and chain on suction and discharge connections. Include elbow at each connection to orient the connections horizontally.

9. *Deficiency:* No site lighting.
   Action: Install new outdoor light on new pole with concrete base.

10. *Deficiency:* Building intake louver damper not operating.
    Action: Install new damper motor.

11. *Deficiency:* Building lighting poor.
    Action: Install new fluorescent fixtures.

12. *Deficiency:* Doors in poor condition.
    Action: Paint doors.
    Action:
13. *Deficiency:* Doors hinges rusty.
    Action: Install stainless steel hinges.

14. *Deficiency:* Building dampers are not protected from the weather.
    Action: Install stainless steel rain hoods over louvers.

15. *Deficiency:* Engine exhaust pipe opening in building wall not sealed.
    Action: Seal opening.

16. *Deficiency:* No light over building door.
    Action: Install lights over building door.

17. *Deficiency:* Pump preventative maintenance
    Action: Install new rotating assembly, wear plates and suction disk. Recondition control panel.

Pump Station No. 20 (Rivers Edge)

This pump station includes a duplex 4-inch Gorman Rupp suction lift pump skid with a propane backup engine driven pump housed in a precast concrete building. The building covers half of the wet well with a manhole outside the building for access to the wet well.

Based on available records, the pump station was constructed in 1997. The following deficiencies were noted during the site visit:

Critical Deficiencies:

1. *Deficiency:* Pump skid not grouted solid causing vibration during pump operation.

Action: Grout pump skid.

2. *Deficiency:* No remote monitoring or alarm annunciation.
   Action: Install wireless remote monitoring equipment.

3. *Deficiency:* Building overheats when emergency backup engine is running.
   Action: Install special intake and exhaust louvers for interior building cooling.

Secondary Deficiencies:

4. *Deficiency:* Pressure gauges.
   Action: Pressure gauges may to work; check and replace as required.

5. *Deficiency:* Flow meter measures flow based on pump run time which is not accurate when pump is running but not pumping flow (i.e. during priming)
   Action: Install magnetic flow meter on common discharge pipe and replace elbow with a tee and sewage combination air valve.

6. *Deficiency:* Poor condition of paint on piping and equipment.
   Action: Paint piping and equipment.

7. *Deficiency:* No emergency pump suction drop pipe
   Action: Install new drop pipe

8. *Deficiency:* Vent does not have gooseneck
   Action: Install fittings as required to provide gooseneck.

9. *Deficiency:* Discharge emergency pump connection does not have quick connect fitting.
   Action: Install quick connect with cap and chain on discharge connection. Include elbow at connection to orient the connections horizontally.

10. *Deficiency:* No site lighting.
    Action: Install new outdoor light on new pole with concrete base.

11. *Deficiency:* Building lighting poor.
    Action: Install new fluorescent fixtures.

12. *Deficiency:* Doors in poor condition.
    Action: Paint doors.
    Action:
13. *Deficiency:* Doors hinges rusty.
    Action: Install stainless steel hinges.

14. *Deficiency:* Building dampers are not protected from the weather.
    Action: Install stainless steel rain hoods over louvers.

15. *Deficiency:* Engine exhaust pipe opening in building wall not sealed.
    Action: Seal opening.

16. *Deficiency:* No light over building door.
    Action: Install lights over building door.

17. *Deficiency:* Pump preventative maintenance
Action: Install new rotating assembly, wear plates and suction disk. Recondition control panel. Install new gages as required.

18. *Deficiency:* Propane piping in building is a tripping hazard.
Action: Relocate pipe.

Pump Station No. 21 (Southpoint)
This pump station includes a duplex 4-inch Gorman Rupp suction lift pump skid with a propane backup engine driven pump housed in a precast concrete building. Half of the wet well is located under to the pump building. Access to the wet well is through a manhole located outside of the building.

Based on available records, the pump station was constructed in 1998. The following deficiencies were noted during the site visit:

Critical Deficiencies:

1. *Deficiency:* Pump skid not grouted solid causing vibration during pump operation.
Action: Grout pump skid.

2. *Deficiency:* Pressure gauges inoperable.
Action: Replace pressure gauges.

3. *Deficiency:* Control panel lights broken.
Action: Replace broken lights and perform general control panel rehabilitation.

4. *Deficiency:* No remote monitoring or alarm annunciation.
Action: Install wireless remote monitoring equipment.

5. *Deficiency:* Pump air release valves not working.
Action: Install new air release valves and piping to wet well.

6. *Deficiency:* Inadequate ventilation for backup engine drive pump. County staff indicated that the room overheated during operation of the backup pump.
Action: Install louvers on existing building walls to allow for adequate ventilation during

Secondary Deficiencies:

7. *Deficiency:* Discharge emergency pump connection does not have quick connect fitting cap.
Action: Install quick connect with cap and chain on discharge connection.

8. *Deficiency:* Wet well does not have a suction drop pipe for emergency pumping.
Action: Install new suction drop pipe.

9. *Deficiency:* Doors and Door frame maintenance.
Action: Paint doors and frame.

10. *Deficiency:* Doors hinges rusty.
Action: Install stainless steel hinges.

11. *Deficiency:* Flow meter measures flow based on pump run time which is not accurate when pump is running but not pumping flow (i.e. during priming)
Action: Install magnetic flow meter on common discharge pipe and replace elbow with a tee and sewage combination air valve.

12. *Deficiency:* Poor condition of paint on piping and equipment.
Action: Paint piping and equipment.

13. *Deficiency:* Lighting in the building is poor.
Action: Install new fluorescent light fixtures.

14. *Deficiency:* Outside lighting is poor.
Action: Install outside light on light pole.

15. *Deficiency:* Dampers are not protected from the weather
Action: Install stainless steel weather hoods over dampers.

16. *Deficiency:* Pump preventative maintenance
Action: Install new rotating assembly, wear plates and suction disk.

17. *Deficiency:* No fence for site security.
Action: Install fence

Pump Station No. 22 (Branchester Section 15)
This pump station includes a duplex 4-inch Gorman Rupp suction lift pump skid with a propane backup engine driven pump housed in a precast concrete building. Half of the wet well is located under to the pump building.

Based on available records, the pump station was constructed in 2000. The following deficiencies were noted during the site visit:

Critical Deficiencies:

1. *Deficiency:* Pump skid not grouted solid causing vibration during pump operation.
Action: Grout pump skid.

2. *Deficiency:* Control panel lights broken.
Action: Replace broken lights and perform general control panel rehabilitation.

3. *Deficiency:* No remote monitoring or alarm annunciation.
Action: Install wireless remote monitoring equipment.

4. *Deficiency:* Pump air release valves not working.
Action: Install new air release valves and piping to wet well.

5. *Deficiency:* Wet well top in building has open holes for hoses from ARVs to discharge to the wet well.
Action: Seal all holes in wet well top.

6. *Deficiency:* Inadequate ventilation for backup engine drive pump. County staff indicated that the room overheated during operation of the backup pump.
   Action: Install louvers on existing building walls to allow for adequate ventilation during

Secondary Deficiencies:

7. *Deficiency:* Pressure gauges inoperable.
   Action: Replace pressure gauges.

8. *Deficiency:* Discharge emergency pump connection does not have quick connect fitting cap.
   Action: Install quick connect with cap and chain on discharge connection.

9. *Deficiency:* Wet well does not have a suction drop pipe for emergency pumping.
   Action: Install new suction drop pipe.

10. *Deficiency:* Wet well hatch does not have safety grating.
    Action: Install safety grating.

11. *Deficiency:* Doors and Door frame maintenance.
    Action: Paint.

12. *Deficiency:* Flow meter measures flow based on pump run time which is not accurate when pump is running but not pumping flow (i.e. during priming)
    Action: Install magnetic flow meter on common discharge pipe and replace elbow with a tee and sewage combination air valve.

13. *Deficiency:* Poor condition of paint on piping and equipment.
    Action: Paint piping and equipment.

14. *Deficiency:* Wet well vent does not have a screen.
    Action: Install screen on vent

15. *Deficiency:* Lighting in the building is poor.
    Action: Install new fluorescent light fixtures.

16. *Deficiency:* Outside lighting is poor.
    Action: Install new outside light on light pole.

17. *Deficiency:* Dampers are not protected from the weather
    Action: Install stainless steel weather hoods over dampers.

18. *Deficiency:* Pump preventative maintenance
    Action: Install new rotating assembly, wear plates and suction disk.
19. *Deficiency:* Fence condition is compromised due to vegetation.
    Action: Clear around fence

Pump Station No. 23 (The Meadows)
This pump station includes a duplex 4-inch Gorman Rupp suction lift pump skid housed in a precast concrete building. Half of the wet well is located under to the pump building. The station has a propane emergency generator located outside adjacent to the building.

Based on available records, the pump station was constructed in 2006. The following deficiencies were noted during the site visit:

Critical Deficiencies:

1. *Deficiency:* No remote monitoring or alarm annunciation.
   Action: Install wireless remote monitoring equipment.

2. *Deficiency:* Pumps are cavitating due to operating too far to the right of their curve.
   Action: Change belts and sheaves to lower the pump speed.

Secondary Deficiencies:

3. *Deficiency:* Suction and discharge emergency pump connections do not have quick connect fitting caps.
   Action: Install quick connect with cap and chain on suction and discharge connections.

4. *Deficiency:* Wet well has an accumulation of grease.
   Action: Install mixer in the wet well.

5. *Deficiency:* Doors and Door frame maintenance.
   Action: Paint.

Pump Station No. 24 (Crosspointe)
This pump station includes a duplex 4-inch Gorman Rupp suction lift pump skid housed in a precast concrete building. Half of the wet well is located under to the pump building.

Based on available records, the pump station was constructed in 2009. The following deficiencies were noted during the site visit:

Critical Deficiencies:

1. *Deficiency:* No remote monitoring or alarm annunciation.
   Action: Install wireless remote monitoring equipment.

2. *Deficiency:* No generator and ATS
   Action: Install diesel generator with a belly tank outside on a slab with the ATS inside the building.

3. *Deficiency:* Junction box located on the wet well top next to wet well access manhole This is a code violation.
   Action: Relocate junction box to the wall of building a minimum of 18" clear above wet well top.

Secondary Deficiencies:

4. *Deficiency:* Flow meter measures flow based on pump run time which is not accurate when pump is running but not pumping flow (i.e. during priming)
   Action: Install magnetic flow meter on common discharge pipe and replace elbow with a tee and sewage combination air valve.

5. *Deficiency:* Suction and discharge emergency pump connections do not have quick connect fitting caps.
   Action: Install quick connect with cap and chain on suction and discharge connections.

6. *Deficiency:* No outside lighting.
   Action: Install outdoor light.

Wastewater Pump Station Budget Cost Estimates

Budgetary level cost estimates were developed for the improvements recommended for each pump station as shown in the table below. Refer to **Attachments 1 - 24** for a detailed breakdown of the budgetary cost estimates.

Wastewater Pump Station Budgetary Cost Estimates Summary

Pump Station No.	Name	Budgetary Cost Estimate
1	Bank of Southside VA	$ 144,200
2	Whispering winds	$ 390,000
3	Country Aire	$ 279,000
4	Pine Ridge	$ 155,700
5	Route 36	$ 666,800
6	Route 301	$ 578,400
7	Johnson Road	$ 406,100
8	Wildwood Farms	$ 416,600
9	Route 460/Jail	$ 453,100
10	Route 460/Food Lion	$ 416,800
11	Beechwood Manor	$ 480,800
12	Crossing Blvd.	$ 420,900
13	Bull Hill Road	$ 419,900
14	Puddledock Area	$ 400,000
15	Route 460/156	$ 444,700
16	Cedarwood	$ 412,300
17	Jordan on the James	$ 567,200
18	Branchester Sec. 12	$ 139,600
19	Baxter Rodge	$ 127,000
20	River's Edge	$ 137,100
21	Southpoint	$ 147,100
22	Branchester Sec. 15	$ 144,400
23	The Meadows	$ 37,900
24	CrosspointeCenter	$ 183,100

All cost estimates are based on unit prices from similar projects and recent cost estimating data. All present costs are based on the October 2014 construction cost index from Engineering News Record. To determine the appropriate costs of these projects in future years, the Engineering News Record Construction Cost Index should be used as follows:

Future Cost = Present Cost x (Future Cost Index / Present Cost Index)

CONCLUSIONS AND RECOMMENDATIONS

Based on the results of this analysis, a significant amount of work will be required to recondition the County's wastewater pump stations. In order to assist in prioritizing upgrades and in order to spread the costs over a longer period of time, the pump station improvements were categorized based on criticality of the deficiencies for each pump station. Generally, higher priority was given to pump stations that were older and/or had safety, reliability, or operational issues. Additionally, the pump station service area was given consideration in the prioritization.

Wastewater Pump Station Improvement Prioritization

Time Frame	Pump Stations
0 – 5 years[1]	2, 5, 6, 14, 16, 17
5 – 10 years	7, 8, 9, 11, 12, 13
10+ years[2]	10, 15

1. *It is recommended that all critical issues should be corrected within the next 5 years for all pump stations.*
2. *A large portion of the secondary issues are minor maintenance items that the County could most likely complete in-house. It is recommended that the low cost secondary items be completed within the next 5 to 10 years as budget allows. Any pump station not specifically included in the above table only includes low cost secondary issues.*

Attachments:

1. Pump Station No. 1 – Budgetary Cost Estimate Breakout
2. Pump Station No. 2 – Budgetary Cost Estimate Breakout
3. Pump Station No. 3 – Budgetary Cost Estimate Breakout
4. Pump Station No. 4 – Budgetary Cost Estimate Breakout
5. Pump Station No. 5 – Budgetary Cost Estimate Breakout
6. Pump Station No. 6 – Budgetary Cost Estimate Breakout
7. Pump Station No. 7 – Budgetary Cost Estimate Breakout
8. Pump Station No. 8 – Budgetary Cost Estimate Breakout
9. Pump Station No. 9 – Budgetary Cost Estimate Breakout
10. Pump Station No. 10 – Budgetary Cost Estimate Breakout
11. Pump Station No. 11 – Budgetary Cost Estimate Breakout
12. Pump Station No. 12 – Budgetary Cost Estimate Breakout
13. Pump Station No. 13 – Budgetary Cost Estimate Breakout
14. Pump Station No. 14 – Budgetary Cost Estimate Breakout
15. Pump Station No. 15 – Budgetary Cost Estimate Breakout
16. Pump Station No. 16 – Budgetary Cost Estimate Breakout
17. Pump Station No. 17 – Budgetary Cost Estimate Breakout
18. Pump Station No. 18 – Budgetary Cost Estimate Breakout
19. Pump Station No. 19 – Budgetary Cost Estimate Breakout
20. Pump Station No. 21 – Budgetary Cost Estimate Breakout
21. Pump Station No. 22 – Budgetary Cost Estimate Breakout
22. Pump Station No. 21 – Budgetary Cost Estimate Breakout
23. Pump Station No. 23 – Budgetary Cost Estimate Breakout
24. Pump Station No. 24 – Budgetary Cost Estimate Breakout

Pump Station 1
Prince George County Department of Public Utilities
Budgetary Cost Estimates
Attachment 1

Date: November 12, 2014

	Description	Quan	Unit	Unit Cost	Extension
	Mobilization	1	LS	$ 10,000.00	$ 10,000.00
	E & S Controls	1	LS	$ 1,000.00	$ 1,000.00
	Bypass pumping (see note 1)		LS	$ -	$ -
Pumps					
	Grout pump bases	1	LS	$ 800.00	$ 800.00
	Recondition pump control panel	1	EA	$ 1,500.00	$ 1,500.00
	Install new gages on GR Duplex Pumps	1	SET	$ 1,240.00	$ 1,240.00
	Paint pumps and Piping	1	EA	$ 4,000.00	$ 4,000.00
	Install magnetic flow meter in building	1	EA	$ 11,500.00	$ 11,500.00
Building					
	Install flouresent lights in building	6	EA	$ 250.00	$ 1,500.00
	Paint doors and frame	1	LS	$ 600.00	$ 600.00
	Install new hinges	6	EA	$ 75.00	$ 450.00
	Install louvers for combustion air	1	LS	$ 19,140.00	$ 19,140.00
Wet Well					
	New wet well top w/ alum hatch, 4" pipe and 10" hole	1	LS	$ 5,190.00	$ 5,190.00
	Install screened vent	1	LS	$ 640.00	$ 640.00
	Install new drop Pipe	1	LS	$ 5,860.00	$ 5,860.00
	Install mixer	1	LS	$ 10,040.00	$ 10,040.00
Emergency Features					
	Install remote annunciation	1	LS	$ 3,840.00	$ 3,840.00
	Install quick connect fittings on emergency discharge	1	LS	$ 960.00	$ 960.00
Safety/Security					
	Install new outside light	1	LS	$ 4,720.00	$ 4,720.00
Electrical					
	Conduit and wiring	1	LS	$ 8,000.00	$ 8,000.00
	New electrical service				
Site Work					
	Site grading	1	LS	$ 1,500.00	$ 1,500.00
	Seeding and mulching	1	LS	$ 800.00	$ 800.00
	Subtotal				*$ 93,280.00*
	Contractor Overhead and Profit	15	%		$ 13,992.00
	Total Estimated Construction Cost				*$ 107,272.00*
	Contingency	20	%		$ 21,454.40
	Engineering	12	%		$ 15,447.17
	Total Budget Estimate				**$ 144,200.00**

Notes:

1. Assume bypass pumping is by Prince George.

Pump Station Number 2
Prince George County Department of Public Utilities
Budgetary Cost Estimates
Attachment 2

Date: November 12, 2014

Description	Quan	Unit	Unit Cost	Extension
Mobilization	1	LS	$ 10,000.00	$ 10,000.00
E and S Controls	1	LS	$ 7,500.00	$ 7,500.00
Bypass pumping (see note 1)		LS	$ -	$ -
Demolition				
Abandon dry pit	1	LS	$ 12,500.00	$ 12,500.00
Clean wet well	1	LS	$ 3,000.00	$ 3,000.00
Remove existing pumps	1	LS	$ 2,000.00	$ 2,000.00
Remove existing piping	1	LS	$ 2,000.00	$ 2,000.00
Remove existing electric service	1	LS	$ 2,000.00	$ 2,000.00
Pumps				
New T4 duplex suction lift pumps, CP, bubbler & Floats	1	LS	$ 57,668.40	$ 57,668.40
4" Suction pipe	2	EA	$ 8,230.00	$ 16,450.50
Paint Suction and discharge piping	1	EA	$ 5,000.00	$ 5,000.00
New pump discharge piping to force main	1	LS	$ 7,900.00	$ 7,900.00
Install magnetic flow meter in building	1	EA	$ 11,500.00	$ 11,500.00
Building				
New pre-cast building (12x16x8)	1	LS	$ 18,499.00	$ 18,499.00
Building 4"floor drain piping to wet well	1	LS	$ 7,010.00	$ 7,010.00
Slab for building over wetwell	1	EA	$ 6,000.00	$ 6,000.00
Exhaust fan and louvers	1	LS	$ 4,500.00	$ 4,500.00
Install unit heater	1	EA	$ 2,030.00	$ 2,030.00
Building outside lights	2	LS	$ 250.00	$ 500.00
Install flouresent lights in building	6	EA	$ 250.00	$ 1,500.00
Wet Well				
New wet well top w/ alum hatch, 4" pipe and 10" hole	1	LS	$ 5,190.00	$ 5,190.00
Install screened vent	1	LS	$ 640.00	$ 640.00
Install new drop Pipe	1	LS	$ 5,860.00	$ 5,860.00
Emergency Features				
Install remote annunciation	1	LS	$ 3,840.00	$ 3,840.00
Install quick connect fittings on emergency discharge	1	LS	$ 960.00	$ 960.00
Safety/Security				
New fence and Gate	120	FT	$ 40.00	$ 4,800.00
Install new outside light	1	LS	$ 4,719.00	$ 4,719.00
Electrical				
Conduit and wiring	1	LS	$ 40,000.00	$ 40,000.00
Site Work				
Site grading	1	LS	$ 7,500.00	$ 7,500.00
Seeding and mulching	1	LS	$ 1,200.00	$ 1,200.00
Subtotal				*$ 252,266.90*
Contractor Overhead and Profit	15	%		$ 37,840.04
Total Estimated Construction Cost				*$ 290,106.94*
Contingency	20	%		$ 58,021.39
Engineering	12	%		$ 41,775.40
Total Budget Estimate				**$ 390,000.00**

Notes:

1. Assume bypass pumping is by Prince George.

Pump Station Number 3
Prince George County Department of Public Utilities
Budgetary Cost Estimates
Attachment 3

Date: November 12, 2014

	Description	Quan	Unit	Unit Cost	Extension
	Mobilization	1	LS	$ 10,000.00	$ 10,000.00
	E and S Controls	1	LS	$ 1,000.00	$ 1,000.00
Pumps					
	New 4" rotating assemblies installed by GR	2	LS	$ 4,560.00	$ 9,120.00
	Recondition pump control panel	1	EA	$ 1,500.00	$ 1,500.00
	Install new gages on GR Duplex Pumps	1	SET	$ 1,240.00	$ 1,240.00
	Replace galv pipe on air vent with ss	2	EA	$ 400.00	$ 800.00
	Install weights or springs on check valves	2	EA	$ 200.00	$ 400.00
	Paint pump and Piping	1	EA	$ 4,000.00	$ 4,000.00
	Install magnetic flow meter in building	1	EA	$ 11,500.00	$ 11,500.00
Building					
	repair intake louver damper motor	1	LS	$ 500.00	$ 500.00
	Install flouresent lights in building	6	EA	$ 250.00	$ 1,500.00
	Repair outside floor drain piping	1	LS	$ 500.00	$ 500.00
	Install new doors	1	EA	$ 2,000.00	$ 2,000.00
	Install new ss damper rain hood	2	EA	$ 800.00	$ 1,600.00
Wet Well					
	New wet well top	1	LS	$ 5,190.00	$ 5,190.00
	Install screened vent	1	LS	$ 640.00	$ 640.00
	Install new drop Pipe	1	LS	$ 5,860.00	$ 5,860.00
	Install mixer	1	LS	$ 10,040.00	$ 10,040.00
Emergency Features					
	Install generator and ATS	1	LS	$ 67,760.00	$ 67,760.00
	Concrete slab for generator	1	LS	$ 4,000.00	$ 4,000.00
	Deck around generator	1	LS	$ 6,000.00	$ 6,000.00
	Install remote annunciation	1	LS	$ 3,840.00	$ 3,840.00
	Install quick connect fittings on emergency discharge	1	LS	$ 960.00	$ 960.00
Safety/Security					
	Repair fence	1	LS	$ 3,500.00	$ 3,500.00
	Install new outside light	1	LS	$ 4,720.00	$ 4,720.00
Electrical					$ -
	Conduit and wiring	1	LS	$ 20,000.00	$ 20,000.00
Site Work					
	Site grading	1	LS	$ 1,500.00	$ 1,500.00
	Seeding and mulching	1	LS	$ 800.00	$ 800.00
	Subtotal				*$ 180,470.00*
	Contractor Overhead and Profit	15	%		$ 27,070.50
	Total Estimated Construction Cost				*$ 207,540.50*
	Contingency	20	%		$ 41,508.10
	Engineering	12	%		$ 29,885.83
	Total Budget Estimate				**$ 279,000.00**

Pump Station Number 4
Prince George County Department of Public Utilities
Budgetary Cost Estimates
Attachment 4

Date: November 12, 2014

	Description	Quan	Unit	Unit Cost	Extension
	Mobilization	1	LS	$ 10,000.00	$ 10,000.00
	E and S Controls	1	LS	$ 1,000.00	$ 1,000.00
	Bypass pumping (see note 1)		LS	$ -	$ -
Pumps, valves & piping					
	New 4" rotating assemblies installed by GR	2	LS	$ 4,560.00	$ 9,120.00
	Grout pump bases	1	LS	$ 800.00	$ 800.00
	Recondition pump control panel	1	EA	$ 1,500.00	$ 1,500.00
	Install new gages on GR Duplex Pumps	1	SET	$ 1,240.00	$ 1,240.00
	Paint pump and Piping	1	EA	$ 4,000.00	$ 4,000.00
	Install magnetic flow meter in building	1	EA	$ 11,500.00	$ 11,500.00
Building					
	Building outside lights	2	Lls	$ 250.00	$ 500.00
	Install flouresent lights in building	6	EA	$ 250.00	$ 1,500.00
	Repair exhaust pipe wall opening	1	EA	$ 500.00	$ 500.00
	Install new doors	1	EA	$ 2,000.00	$ 2,000.00
	Install louvers for combustion air	1	LS	$ 19,140.00	$ 19,140.00
	Install new ss damper rain hood	2	EA	$ 800.00	$ 1,600.00
Wet Well					
	New wet well top w/ alum hatch, 4" pipe and 10" hole	1	LS	$ 5,190.00	$ 5,190.00
	Install screened vent	1	LS	$ 640.00	$ 640.00
	Install new drop Pipe	1	LS	$ 5,860.00	$ 5,860.00
Emergency Features					
	Install remote annunciation	1	LS	$ 3,840.00	$ 3,840.00
	Install quick connect fittings on emergency discharge	1	LS	$ 960.00	$ 960.00
Safety/Security					
	New fence and Gate	120	FT	$ 40.00	$ 4,800.00
	Install new outside light	1	LS	$ 4,720.00	$ 4,720.00
Electrical					
	Conduit and wiring	1	LS	$ 8,000.00	$ 8,000.00
Site Work					
	Site grading	1	LS	$ 1,500.00	$ 1,500.00
	Seeding and mulching	1	LS	$ 800.00	$ 800.00
	Subtotal				*$ 100,710.00*
	Contractor Overhead and Profit	15	%		$ 15,106.50
	Total Estimated Construction Cost				*$ 115,816.50*
	Contingency	20	%		$ 23,163.30
	Engineering	12	%		$ 16,677.58
	Total Budget Estimate				**$ 155,700.00**

Notes:
1. Assume bypass pumping is by Prince George.

Pump Station Number 5
Prince George County Department of Public Utilities
Budgetary Cost Estimates
Attachment 5

Date: November 12, 2014

	Description	Quan	Unit	Unit Cost	Extension
	Mobilization	1	LS	$ 10,000.00	$ 10,000.00
	E and S Controls	1	LS	$ 1,000.00	$ 1,000.00
	Bypass pumping (see note 1)		LS	$ -	$ -
Demolition					
	Demolish old wet well	1	LS	$ 6,000.00	$ 6,000.00
	Demolish old valve vault	1	LS	$ 3,000.00	$ 3,000.00
	Clean wet well	1	LS	$ 3,000.00	$ 3,000.00
	Remove existing pumps	1	LS	$ 2,000.00	$ 2,000.00
	Remove existing piping	1	LS	$ 2,000.00	$ 2,000.00
	Remove existing electric service	1	LS	$ 2,000.00	$ 2,000.00
Pumps					
	New T4 duplex suction lift pumps, CP, bubbler & Floats	1	LS	$ 57,670.00	$ 57,670.00
	6" Suction pipe	2	EA	$ 9,440.00	$ 18,880.00
	Paint pump and Piping	1	EA	$ 5,000.00	$ 5,000.00
	New pump discharge piping to force main	1	LS	$ 20,000.00	$ 20,000.00
	Install magnetic flow meter in building	1	EA	$ 11,500.00	$ 11,500.00
Building					
	New pre-cast building (12x16x8)	1	LS	$ 18,499.00	$ 18,499.00
	Building 4"floor drain piping to wet well	1	LS	$ 7,010.00	$ 7,010.00
	Slab for building over wetwell	1	EA	$ 6,000.00	$ 6,000.00
	Exhaust fan and louvers	1	LS	$ 4,500.00	$ 4,500.00
	Install unit heater	1	EA	$ 2,030.00	$ 2,030.00
	Building outside lights	2	LS	$ 250.00	$ 500.00
	Install flouresent lights in building	6	EA	$ 250.00	$ 1,500.00
Wet Well					
	New wet well	1	LS	$ 25,000.00	$ 25,000.00
	Aluminum hatch & safety grating cast in top	1	LS	$ 3,000.00	$ 3,000.00
	Install screened vent	1	LS	$ 640.00	$ 640.00
	Install new drop Pipe	1	LS	$ 5,860.00	$ 5,670.00
	Pipe supports in wet well	1	LS	$ 6,000.00	$ 6,000.00
Gravity Piping					$ -
	24" casing jack and bore	100	LF	$ 300.00	$ 30,000.00
	12" gravity sewer	300	LF	$ 120.00	$ 36,000.00
	2-4ft manholes 18 feet deep	36	VF	$ 300.00	$ 10,800.00
Emergency Features					
	Install generator and ATS	1	LS	$ 44,660.00	$ 44,660.00
	Concrete slab for generator	1	LS	$ 4,000.00	$ 4,000.00
	Deck around generator	1	LS	$ 6,000.00	$ 6,000.00
	Install remote annunciation (Raco + 3 year service)	1	LS	$ 3,840.00	$ 3,840.00
	Install quick connect fittings on emergency discharge	1	LS	$ 960.00	$ 960.00
	Install emergency pump connection	1	LS	$ 7,110.00	$ 7,110.00
Safety/Security					
	New fence and Gate	160	FT	$ 40.00	$ 6,400.00
	Install new outside light	1	LS	$ 4,720.00	$ 4,720.00
Electrical					
	Conduit and wiring	1	LS	$ 30,000.00	$ 30,000.00
	New electrical service	1	LS	$ 20,000.00	$ 20,000.00
Site Work					
	Site grading	1	LS	$ 3,000.00	$ 3,000.00
	Seeding and mulching	1	LS	$ 1,500.00	$ 1,500.00
	Subtotal				*$ 431,389.00*
	Contractor Overhead and Profit	15	%		$ 64,708.35
	Total Estimated Construction Cost				*$ 496,097.35*
	Contingency	20	%		$ 99,219.47
	Engineering	12	%		$ 71,438.02
	Total Budget Estimate				**$ 666,800.00**

Notes:

1. Assume bypass pumping is by Prince George.

Pump Station Number 6
Prince George County Department of Public Utilities
Budgetary Cost Estimates
Attachment 6

Date: November 12, 2014

	Description	Quan	Unit	Unit Cost	Extension
	Mobilization	1	LS	$ 10,000.00	$ 10,000.00
	E and S Controls	1	LS	$ 1,000.00	$ 1,000.00
	Bypass pumping (see note 1)		LS	$ -	$ -
Demolition					
	Remove existing building and grating	1	LS	$ 20,000.00	$ 20,000.00
	Clean wet well	1	LS	$ 30,000.00	$ 30,000.00
	Remove existing pumps	1	LS	$ 2,000.00	$ 2,000.00
	Remove existing piping	1	LS	$ 6,000.00	$ 6,000.00
	Remove existing electric service & equipment	1	LS	$ 7,500.00	$ 7,500.00
Pumps					
	New T6 duplex suction lift pumps, CP, bubbler & Floats	1	LS	$ 63,990.00	$ 63,990.00
	6" Suction pipe	2	EA	$ 9,440.00	$ 18,880.00
	New 6" pump discharge piping to force main	1	LS	$ 9,330.00	$ 9,330.00
	Paint pump and Piping	1	LS	$ 6,000.00	$ 6,000.00
	Install 6" magnetic flow meter in building	1	EA	$ 13,590.00	$ 13,590.00
Building					
	New pre-cast building	1	LS	$ 18,499.00	$ 18,499.00
	Building 4"floor drain piping to wet well	1	LS	$ 7,010.00	$ 7,010.00
	Slab for building over wetwell	1	EA	$ 6,000.00	$ 6,000.00
	Exhaust fan and louvers	1	LS	$ 4,500.00	$ 4,500.00
	Install unit heater	1	EA	$ 1,800.00	$ 1,800.00
	Building outside lights	2	LS	$ 250.00	$ 500.00
	Install flouresent lights in building	6	EA	$ 250.00	$ 1,500.00
Wet Well					
	Install slab over existing structure at grade level	1	LS	$ 14,500.00	$ 14,500.00
	Aluminum hatch & safety grating cast in top	1	LS	$ 3,000.00	$ 3,000.00
	Install screened vent	1	LS	$ 640.00	$ 640.00
	Install new 6" drop Pipe	1	LS	$ 5,860.00	$ 5,860.00
	Install mixer	1	LS	$ 10,040.00	$ 10,040.00
	Install ss pipe supports in wet well	1	LS	$ 12,000.00	$ 12,000.00
Emergency Features					
	Deck around generator	1	LS	$ 6,000.00	$ 6,000.00
	Install remote annunciation	1	LS	$ 3,840.00	$ 3,840.00
	Install quick connect fittings on emergency discharge	1	LS	$ 960.00	$ 960.00
Safety/Security					
	Install new outside light	1	LS	$ 4,720.00	$ 4,720.00
Electrical					
	Conduit and wiring	1	LS	$ 60,000.00	$ 60,000.00
	Relocate main service by power company	1	LS	$ 15,000.00	$ 15,000.00
Site Work					
	Site grading	1	LS	$ 7,500.00	$ 7,500.00
	Seeding and mulching	1	LS	$ 2,000.00	$ 2,000.00
	Subtotal				*$ 374,159.00*
	Contractor Overhead and Profit	15	%		$ 56,123.85
	Total Estimated Construction Cost				*$ 430,282.85*
	Contingency	20	%		$ 86,056.57
	Engineering	12	%		$ 61,960.73
	Total Budget Estimate				**$ 578,400.00**

Notes:

1. Assume bypass pumping is by Prince George.

Pump Station Number 7
Prince George County Department of Public Utilities
Budgetary Cost Estimates
Attachment 7

Date: November 14, 2014

Description	Quan	Unit	Unit Cost	Extension
Mobilization	1	LS	$ 10,000.00	$ 10,000.00
E and S Controls	1	LS	$ 1,000.00	$ 1,000.00
Demolition				
Clean wet well	1	LS	$ 3,000.00	$ 3,000.00
Remove existing pumps	1	LS	$ 2,000.00	$ 2,000.00
Remove existing piping	1	LS	$ 2,000.00	$ 2,000.00
Remove existing electric service	1	LS	$ 2,000.00	$ 2,000.00
Pumps				
New T4 duplex suction lift pumps, CP, bubbler & Floats	1	LS	$ 57,670.00	$ 57,670.00
Paint pump and Piping	1	EA	$ 4,000.00	$ 4,000.00
4" Suction pipe	2	EA	$ 8,230.00	$ 16,460.00
New 4" pump discharge piping to force main	1	LS	$ 7,900.00	$ 7,900.00
Install 4" magnetic flow meter in building	1	EA	$ 11,500.00	$ 11,500.00
Building				
New pre-cast building (12x16x8)	1	LS	$ 18,499.00	$ 18,499.00
Building 4" floor drain piping to wet well	1	LS	$ 7,010.00	$ 7,010.00
Slab for building over wetwell	1	EA	$ 6,000.00	$ 6,000.00
Exhaust fan and louvers	1	LS	$ 4,500.00	$ 4,500.00
Install unit heater	1	EA	$ 2,030.00	$ 2,030.00
Building outside lights	2	EA	$ 250.00	$ 500.00
Install flouresent lights in building	6	EA	$ 250.00	$ 1,500.00
Wet Well				
New wet well top w/ alum hatch, 4" pipe and 10" hole	1	LS	$ 5,190.00	$ 5,190.00
Install screened vent	1	LS	$ 640.00	$ 640.00
Install new drop Pipe	1	LS	$ 5,860.00	$ 5,860.00
Emergency Features				
Install generator and ATS	1	LS	$ 44,660.00	$ 44,660.00
Concrete slab for generator	1	LS	$ 4,000.00	$ 4,000.00
Deck around generator	1	LS	$ 6,000.00	$ 6,000.00
Install remote annunciation	1	LS	$ 3,840.00	$ 3,840.00
Install quick connect fittings on emergency discharge	1	LS	$ 960.00	$ 960.00
Safety/Security				
Repair fence	1	LS	$ 1,500.00	$ 1,500.00
Install new outside light	1	LS	$ 4,720.00	$ 4,720.00
Electrical				
Conduit and wiring	1	LS	$ 25,000.00	$ 25,000.00
Site Work				
Site grading	1	LS	$ 2,000.00	$ 2,000.00
Seeding and mulching	1	LS	$ 800.00	$ 800.00
Subtotal				*$ 262,739.00*
Contractor Overhead and Profit	15	%		$ 39,410.85
Total Estimated Construction Cost				*$ 302,149.85*
Contingency	20	%		$ 60,429.97
Engineering	12	%		$ 43,509.58
Total Budget Estimate				**$ 406,100.00**

Notes:

1. Assume bypass pumping is by Prince George.

Pump Station Number 8
Prince George County Department of Public Utilities
Budgetary Cost Estimates
Attachment 8

Date: November 14, 2014

	Description	Quan	Unit	Unit Cost	Extension
	Mobilization	1	LS	$ 10,000.00	$ 10,000.00
	E and S Controls	1	LS	$ 1,000.00	$ 1,000.00
	Bypass pumping (see note 1)		LS	$ -	$ -
Demolition					
	Clean wet well	1	LS	$ 3,000.00	$ 3,000.00
	Remove existing pumps	1	LS	$ 2,000.00	$ 2,000.00
	Remove existing piping	1	LS	$ 2,000.00	$ 2,000.00
	Remove existing electric service	1	LS	$ 2,000.00	$ 2,000.00
Pumps					
	New T4 duplex suction lift pumps, CP, bubbler & Floats	1	LS	$ 57,670.00	$ 57,670.00
	Paint pump and Piping	1	EA	$ 4,000.00	$ 4,000.00
	4" Suction pipe	2	EA	$ 8,230.00	$ 16,460.00
	New 4" pump discharge piping to force main	1	LS	$ 7,900.00	$ 7,900.00
	Install 4" magnetic flow meter in building	1	EA	$ 11,500.00	$ 11,500.00
Building					
	New pre-cast building (12x16xx8)	1	LS	$ 18,499.00	$ 18,499.00
	Building 4"floor drain piping to wet well	1	LS	$ 7,010.00	$ 7,010.00
	Slab for building over wetwell	1	EA	$ 6,000.00	$ 6,000.00
	Exhaust fan and louvers	1	LS	$ 4,500.00	$ 4,500.00
	Install unit heater	1	EA	$ 2,030.00	$ 2,030.00
	Building outside lights	2	EA	$ 250.00	$ 500.00
	Install flouresent lights in building	6	EA	$ 250.00	$ 1,500.00
Wet Well					
	New wet well top w/ alum hatch, 4" pipe and 10" hole	1	LS	$ 5,190.00	$ 5,190.00
	Install screened vent	1	LS	$ 640.00	$ 640.00
	Install new drop Pipe	1	LS	$ 5,860.00	$ 5,860.00
Emergency Features					
	Install generator and ATS	1	LS	$ 44,660.00	$ 44,660.00
	Concrete slab for generator	1	LS	$ 4,000.00	$ 4,000.00
	Deck around generator	1	LS	$ 6,000.00	$ 6,000.00
	Install remote annunciation	1	LS	$ 3,840.00	$ 3,840.00
	Install quick connect fittings on emergency discharge	1	LS	$ 960.00	$ 960.00
Safety/Security					
	New fence and Gate	120	FT	$ 40.00	$ 4,800.00
	Install new outside light	1	LS	$ 4,720.00	$ 4,720.00
Electrical					
	Conduit and wiring	1	LS	$ 25,000.00	$ 25,000.00
	Sand blast and paint electric steel panel board	1	LS	$ 4,000.00	$ 4,000.00
Site Work					
	Site grading	1	LS	$ 1,500.00	$ 1,500.00
	Seeding and mulching	1	LS	$ 800.00	$ 800.00
	Subtotal				*$ 269,539.00*
	Contractor Overhead and Profit	15	%		$ 40,430.85
	Total Estimated Construction Cost				*$ 309,969.85*
	Contingency	20	%		$ 61,993.97
	Engineering	12	%		$ 44,635.66
	Total Budget Estimate				**$ 416,600.00**

Notes:
1. Assume bypass pumping is by Prince George.

Pump Station Number 9
Prince George County Department of Public Utilities
Budgetary Cost Estimates
Attachment 9

Date: November 12, 2014

	Description	Quan	Unit	Unit Cost	Extension
	Mobilization	1	LS	$ 10,000.00	$ 10,000.00
	E and S Controls	1	LS	$ 1,000.00	$ 1,000.00
	Bypass pumping (see note 1)		LS	$ -	$ -
Demolition					
	Clean wet well	1	LS	$ 3,000.00	$ 3,000.00
	Remove existing pumps	1	LS	$ 2,000.00	$ 2,000.00
	Remove existing piping	1	LS	$ 2,000.00	$ 2,000.00
	Remove existing electric service	1	LS	$ 2,000.00	$ 2,000.00
Pumps					
	New T6 duplex suction lift pumps, CP, bubbler & Floats	1	LS	$ 63,990.00	$ 63,990.00
	Paint pump and Piping	1	EA	$ 5,000.00	$ 5,000.00
	6" Suction pipe	2	EA	$ 9,440.00	$ 18,880.00
	New 6" pump discharge piping to force main	1	LS	$ 9,330.00	$ 9,330.00
	Install magnetic flow meter in building	1	EA	$ 13,590.00	$ 13,590.00
Building					
	New pre-cast building (12x16x8)	1	LS	$ 18,499.00	$ 18,499.00
	Building 4"floor drain piping to wet well	1	LS	$ 7,010.00	$ 7,010.00
	Slab for building over wetwell	1	EA	$ 6,000.00	$ 6,000.00
	Exhaust fan and louvers	1	LS	$ 4,500.00	$ 4,500.00
	Install unit heater	1	EA	$ 2,030.00	$ 2,030.00
	Building outside lights	2	EA	$ 250.00	$ 500.00
	Install flouresent lights in building	6	EA	$ 250.00	$ 1,500.00
Wet Well					
	New wet well top w/ alum hatch, 4" pipe and 10" hole	1	LS	$ 5,190.00	$ 5,190.00
	Install screened vent	1	LS	$ 640.00	$ 640.00
	Install new drop Pipe	1	LS	$ 5,860.00	$ 5,860.00
Emergency Features					
	Install generator and ATS	1	LS	$ 56,980.00	$ 56,980.00
	Concrete slab for generator	1	LS	$ 4,000.00	$ 4,000.00
	Deck around generator	1	LS	$ 6,000.00	$ 6,000.00
	Install remote annunciation	1	LS	$ 3,840.00	$ 3,840.00
	Install quick connect fittings on emergency discharge	1	LS	$ 960.00	$ 960.00
Safety/Security					
	New fence and Gate	120	FT	$ 40.00	$ 4,800.00
	Install new outside light	1	LS	$ 4,720.00	$ 4,720.00
Electrical					$ -
	Conduit and wiring	1	LS	$ 25,000.00	$ 25,000.00
Site Work					
	Site grading	1	LS	$ 1,500.00	$ 1,500.00
	Clearing around fence	1	LS	$ 2,000.00	$ 2,000.00
	Seeding and mulching	1	LS	$ 800.00	$ 800.00
	Subtotal				*$ 293,119.00*
	Contractor Overhead and Profit	15	%		$ 43,967.85
	Total Estimated Construction Cost				*$ 337,086.85*
	Contingency	20	%		$ 67,417.37
	Engineering	12	%		$ 48,540.51
	Total Budget Estimate				**$ 453,100.00**

Notes:
1. Assume bypass pumping is by Prince George.

Pump Station Number 10
Prince George County Department of Public Utilities
Budgetary Cost Estimates
Attachment 10

Date: December 3, 2014

	Description	Quan	Unit	Unit Cost	Extension
	Mobilization	1	LS	$ 10,000.00	$ 10,000.00
	E and S Controls	1	LS	$ 1,000.00	$ 1,000.00
	Bypass pumping (see note 1)		LS	$ -	$ -
Demolition					
	Clean wet well	1	LS	$ 3,000.00	$ 3,000.00
	Remove existing pumps	1	LS	$ 2,000.00	$ 2,000.00
	Remove existing piping	1	LS	$ 2,000.00	$ 2,000.00
	Remove existing electric service	1	LS	$ 2,000.00	$ 2,000.00
Pumps					
	New T4 duplex suction lift pumps, CP, bubbler & Floats	1	LS	$ 57,670.00	$ 57,670.00
	4" Suction pipe	2	EA	$ 8,230.00	$ 16,460.00
	New 4" pump discharge piping to force main	1	LS	$ 7,900.00	$ 7,900.00
	Paint pump and Piping	1	EA	$ 4,000.00	$ 4,000.00
	Install magnetic flow meter in building	1	EA	$ 11,500.00	$ 11,500.00
Building					
	New pre-cast building (12x16x8)	1	LS	$ 18,499.00	$ 18,499.00
	Building 4"floor drain piping to wet well	1	LS	$ 7,010.00	$ 7,010.00
	Slab for building over wetwell	1	EA	$ 6,000.00	$ 6,000.00
	Exhaust fan and louvers	1	LS	$ 4,500.00	$ 4,500.00
	Install unit heater	1	EA	$ 2,030.00	$ 2,030.00
	Building outside lights	2	EA	$ 250.00	$ 500.00
	Install flouresent lights in building	6	EA	$ 250.00	$ 1,500.00
Wet Well					
	New wet well top w/ alum hatch, 4" pipe and 10" hole	1	LS	$ 5,190.00	$ 5,190.00
	Install screened vent	1	LS	$ 640.00	$ 640.00
	Install new drop Pipe	1	LS	$ 5,860.00	$ 5,860.00
	Repair manhole cover	1	LS	$ 600.00	$ 600.00
Emergency Features					
	Install generator and ATS	1	LS	$ 44,660.00	$ 44,660.00
	Concrete slab for generator	1	LS	$ 4,000.00	$ 4,000.00
	Deck around generator	1	LS	$ 6,000.00	$ 6,000.00
	Install remote annunciation	1	LS	$ 3,840.00	$ 3,840.00
	Install quick connect fittings on emergency discharge	1	LS	$ 960.00	$ 960.00
Safety/Security					
	New fence and Gate	120	FT	$ 40.00	$ 4,800.00
	Install new outside light	1	LS	$ 4,720.00	$ 4,720.00
Electrical					
	Conduit and wiring	1	LS	$ 25,000.00	$ 25,000.00
Site Work					
	Site grading	1	LS	$ 3,000.00	$ 3,000.00
	Seeding and mulching	1	LS	$ 800.00	$ 800.00
	Clearing around fence	1	LS	$ 2,000.00	$ 2,000.00
	Subtotal				*$ 269,639.00*
	Contractor Overhead and Profit	15	%		$ 40,445.85
	Total Estimated Construction Cost				*$ 310,084.85*
	Contingency	20	%		$ 62,016.97
	Engineering	12	%		$ 44,652.22
	Total Budget Estimate				**$ 416,800.00**

Notes:

1. Assume bypass pumping is by Prince George.

Pump Station Number 11
Prince George County Department of Public Utilities
Budgetary Cost Estimates
Attachment 11

Date: November 12, 2014

	Description	Quan	Unit	Unit Cost	Extension
	Mobilization	1	LS	$ 10,000.00	$ 10,000.00
	E and S Controls	1	LS	$ 1,000.00	$ 1,000.00
	Bypass pumping (see note 1)		LS	$ -	$ -
Demolition					
	Clean wet well	1	LS	$ 3,000.00	$ 3,000.00
	Clean wet well	1	LS	$ 3,000.00	$ 3,000.00
	Remove existing pumps	1	LS	$ 2,000.00	$ 2,000.00
	Remove existing piping	1	LS	$ 2,000.00	$ 2,000.00
	Remove existing electric service	1	LS	$ 2,000.00	$ 2,000.00
Pumps					
	New submersible pumps with CP and level control	1	LS	$ 37,468.00	$ 37,468.00
	New 4" submersible pump discharge piping to force main including valve vault	1	LS	$ 69,020.00	$ 69,020.00
	Install 4" magnetic flow meter in manhole	1	EA	$ 24,690.00	$ 24,690.00
Wet Well					
	New wet well top w/ alum hatch, 4" pipe and 10" hole	1	LS	$ 5,190.00	$ 5,190.00
	Install screened vent	1	LS	$ 640.00	$ 640.00
	Install new drop Pipe	1	LS	$ 5,860.00	$ 5,860.00
	Portable hoist	1	LS	$ 3,000.00	$ 3,000.00
	Stairs and handrail	1	LS	$ 8,000.00	$ 8,000.00
Emergency Features					
	Install generator and ATS	1	LS	$ 44,660.00	$ 44,660.00
	Install remote annunciation	1	LS	$ 3,840.00	$ 3,840.00
	Install quick connect fittings on emergency discharge	1	LS	$ 960.00	$ 960.00
	Concrete piers and grating for electrical	1	LS	$ 8,000.00	$ 8,000.00
	Concrete piers and grating for generator	1	LS	$ 15,000.00	$ 15,000.00
	Concrete piers and grating for gen fuel tank	1	LS	$ 12,000.00	$ 12,000.00
Safety/Security					
	Install new outside light	1	LS	$ 4,720.00	$ 4,720.00
Electrical					$ -
	Conduit and wiring	1	LS	$ 40,000.00	$ 40,000.00
Site Work					
	Site grading	1	LS	$ 3,500.00	$ 3,500.00
	Seeding and mulching	1	LS	$ 1,500.00	$ 1,500.00
	Subtotal				*$ 311,048.00*
	Contractor Overhead and Profit	15	%		$ 46,657.20
	Total Estimated Construction Cost				*$ 357,705.20*
	Contingency	20	%		$ 71,541.04
	Engineering	12	%		$ 51,509.55
	Total Budget Estimate				**$ 480,800.00**

Notes:

1. Assume bypass pumping is by Prince George.

Pump Station Number 12
Prince George County Department of Public Utilities
Budgetary Cost Estimates
Attachment 12

Date: November 25, 2014

	Description	Quan	Unit	Unit Cost	Extension
	Mobilization	1	LS	$ 10,000.00	$ 10,000.00
	E and S Controls	1	LS	$ 1,000.00	$ 1,000.00
	Bypass pumping (see note 1)		LS	$ -	$ -
Demolition					
	Clean wet well	1	LS	$ 3,000.00	$ 3,000.00
	Remove existing pumps	1	LS	$ 2,000.00	$ 2,000.00
	Remove existing piping	1	LS	$ 2,000.00	$ 2,000.00
	Remove existing electric service	1	LS	$ 2,000.00	$ 2,000.00
Pumps					
	New T4 duplex suction lift pumps, CP, bubbler & Floats	1	LS	$ 57,670.00	$ 57,670.00
	Paint pump and Piping	1	EA	$ 5,000.00	$ 5,000.00
	4" Suction pipe	2	EA	$ 8,230.00	$ 16,460.00
	New 4" pump discharge piping to force main (GR pms)	1	LS	$ 7,900.00	$ 7,900.00
	Install magnetic flow meter in building	1	EA	$ 11,500.00	$ 11,500.00
Building					
	New pre-cast building (12x16x8)	1	LS	$ 18,499.00	$ 18,499.00
	Building 4" floor drain piping to wet well	1	LS	$ 7,010.00	$ 7,010.00
	Slab for building over wetwell	1	EA	$ 6,000.00	$ 6,000.00
	Exhaust fan and louvers	1	LS	$ 4,500.00	$ 4,500.00
	Install unit heater	1	EA	$ 2,030.00	$ 2,030.00
	Building outside lights	2	EA	$ 250.00	$ 500.00
	Install flouresent lights in building	6	EA	$ 250.00	$ 1,500.00
Wet Well					
	New wet well top w/ alum hatch, 4" pipe and 10" hole	1	LS	$ 5,190.00	$ 5,190.00
	Install screened vent	1	LS	$ 640.00	$ 640.00
	Install new drop Pipe	1	LS	$ 5,860.00	$ 5,860.00
	Add 6 ft section to wetwell	1	LS	$ 6,000.00	$ 6,000.00
Emergency Features					
	Install generator and ATS	1	LS	$ 44,660.00	$ 44,660.00
	Concrete slab for generator	1	LS	$ 4,000.00	$ 4,000.00
	Deck around generator	1	LS	$ 6,000.00	$ 6,000.00
	Install remote annunciation	1	LS	$ 3,864.00	$ 3,864.00
	Install quick connect fittings on emergency discharge	1	LS	$ 960.00	$ 960.00
Safety/Security					
	Repair fence	1	LS	$ 3,000.00	$ 3,000.00
	Install new outside light	1	LS	$ 4,720.00	$ 4,720.00
Electrical					$ -
	Conduit and wiring	1	LS	$ 25,000.00	$ 25,000.00
Site Work					
	Site grading	1	LS	$ 3,000.00	$ 3,000.00
	Seeding and mulching	1	LS	$ 800.00	$ 800.00
	Subtotal				*$ 272,263.00*
	Contractor Overhead and Profit	15	%		$ 40,839.45
	Total Estimated Construction Cost				*$ 313,102.45*
	Contingency	20	%		$ 62,620.49
	Engineering	12	%		$ 45,086.75
	Total Budget Estimate				**$ 420,900.00**

Notes:

1. Assume bypass pumping is by Prince George.

Pump Station Number 13
Prince George County Department of Public Utilities
Budgetary Cost Estimates
Attachment 13

Date: November 12, 2014

	Description	Quan	Unit	Unit Cost	Extension
	Mobilization	1	LS	$ 10,000.00	$ 10,000.00
	E and S Controls	1	LS	$ 1,000.00	$ 1,000.00
	Bypass pumping (see note 1)		LS	$ -	$ -
Demolition					
	Clean wet well	1	LS	$ 3,000.00	$ 3,000.00
	Remove existing pumps	1	LS	$ 2,000.00	$ 2,000.00
	Remove existing piping	1	LS	$ 2,000.00	$ 2,000.00
	Remove existing electric service	1	LS	$ 2,000.00	$ 2,000.00
Pumps					
	New T4 duplex suction lift pumps, CP, bubbler & Floats	1	LS	$ 57,670.00	$ 57,670.00
	4" Suction pipe	2	EA	$ 8,230.00	$ 16,460.00
	Paint pump and Piping	1	EA	$ 5,000.00	$ 5,000.00
	New 4" pump discharge piping to force main (GR pms)	1	LS	$ 7,900.00	$ 7,900.00
	Install magnetic flow meter in building	1	EA	$ 11,500.00	$ 11,500.00
Building					
	New pre-cast building (12x16x8)	1	LS	$ 18,499.00	$ 18,499.00
	Building 4"floor drain piping to wet well	1	LS	$ 7,010.00	$ 7,010.00
	Slab for building over wetwell	1	EA	$ 6,000.00	$ 6,000.00
	Exhaust fan and louvers	1	LS	$ 4,500.00	$ 4,500.00
	Install unit heater	1	EA	$ 2,030.00	$ 2,030.00
	Building outside lights	2	EA	$ 250.00	$ 500.00
	Install flouresent lights in building	6	EA	$ 250.00	$ 1,500.00
Wet Well					
	New wet well top w/ alum hatch, 4" pipe and 10" hole	1	LS	$ 5,190.00	$ 5,190.00
	Install screened vent	1	LS	$ 640.00	$ 640.00
	Install new drop Pipe	1	LS	$ 5,860.00	$ 5,860.00
	Add 6 ft section to wetwell	1	LS	$ 6,000.00	$ 6,000.00
Emergency Features					
	Install generator and ATS	1	LS	$ 44,660.00	$ 44,660.00
	Concrete slab for generator	1	LS	$ 4,000.00	$ 4,000.00
	Deck around generator	1	LS	$ 6,000.00	$ 6,000.00
	Install remote annunciation	1	LS	$ 3,840.00	$ 3,840.00
	Install quick connect fittings on emergency discharge	1	LS	$ 960.00	$ 960.00
Safety/Security					
	Repair Fence	60	FT	$ 40.00	$ 2,400.00
	Install new outside light	1	LS	$ 4,720.00	$ 4,720.00
Electrical					
	Conduit and wiring	1	LS	$ 25,000.00	$ 25,000.00
Site Work					
	Site grading	1	LS	$ 3,000.00	$ 3,000.00
	Seeding and mulching	1	LS	$ 800.00	$ 800.00
	Subtotal				*$ 271,639.00*
	Contractor Overhead and Profit	15	%		$ 40,745.85
	Total Estimated Construction Cost				*$ 312,384.85*
	Contingency	20	%		$ 62,476.97
	Engineering	12	%		$ 44,983.42
	Total Budget Estimate				**$ 419,900.00**

Notes:
1. Assume bypass pumping is by Prince George.

Pump Station Number 14
Prince George County Department of Public Utilities
Budgetary Cost Estimates
Attachment 14

Date: November 12, 2014

	Description	Quan	Unit	Unit Cost	Extension
	Mobilization	1	LS	$ 10,000.00	$ 10,000.00
	E and S Controls	1	LS	$ 1,000.00	$ 1,000.00
	Bypass pumping (see note 1)		LS	$ -	$ -
Demolition					
	Clean wet well	1	LS	$ 3,000.00	$ 3,000.00
	Remove top section of wet well	1	LS	$ 1,500.00	$ 1,500.00
	Remove existing pumps	1	LS	$ 2,000.00	$ 2,000.00
	Remove existing piping	1	LS	$ 2,000.00	$ 2,000.00
	Remove existing electric service	1	LS	$ 2,000.00	$ 2,000.00
Pumps					
	New T4 duplex suction lift pumps, CP, bubbler & Floats	1	LS	$ 57,670.00	$ 57,670.00
	4" Suction pipe	2	EA	$ 8,230.00	$ 16,460.00
	Paint pump and Piping	1	EA	$ 5,000.00	$ 5,000.00
	New 4" pump discharge piping to force main (GR pms)	1	LS	$ 7,900.00	$ 7,900.00
	Install 4" magnetic flow meter in building	1	EA	$ 11,500.00	$ 11,500.00
Building					
	New pre-cast building	1	LS	$ 18,499.00	$ 18,499.00
	Building 4" floor drain piping to wet well	1	LS	$ 7,010.00	$ 7,010.00
	Slab for building over wetwell	1	EA	$ 6,000.00	$ 6,000.00
	Exhaust fan and louvers	1	LS	$ 4,500.00	$ 4,500.00
	Install unit heater	1	EA	$ 2,030.00	$ 2,030.00
	Building outside lights	2	EA	$ 250.00	$ 500.00
	Install flouresent lights in building	6	EA	$ 250.00	$ 1,500.00
Wet Well					
	New wet well top w/ alum hatch, 4" pipe and 10" hole	1	LS	$ 5,190.00	$ 5,190.00
	Install screened vent	1	LS	$ 640.00	$ 640.00
	Install new drop Pipe	1	LS	$ 5,860.00	$ 5,860.00
Emergency Features					
	Install generator and ATS	1	LS	$ 44,660.00	$ 44,660.00
	Concrete slab for generator	1	LS	$ 4,000.00	$ 4,000.00
	Deck around generator	1	LS	$ 6,000.00	$ 6,000.00
	Install remote annunciation	1	LS	$ 3,840.00	$ 3,840.00
	Install quick connect fittings on emergency discharge	1	LS	$ 960.00	$ 960.00
Safety/Security					
	Install new outside light	1	LS	$ 4,720.00	$ 4,720.00
Electrical					
	Conduit and wiring	1	LS	$ 20,000.00	$ 20,000.00
Site Work					
	Site grading	1	LS	$ 2,000.00	$ 2,000.00
	Seeding and mulching	1	LS	$ 800.00	$ 800.00
	Subtotal				*$ 258,739.00*
	Contractor Overhead and Profit	15	%		$ 38,810.85
	Total Estimated Construction Cost				*$ 297,549.85*
	Contingency	20	%		$ 59,509.97
	Engineering	12	%		$ 42,847.18
	Total Budget Estimate				**$ 400,000.00**

Notes:

1. Assume bypass pumping is by Prince George.

Pump Station Number 15
Prince George County Department of Public Utilities
Budgetary Cost Estimates
Attachment 15

Date: November 12, 2014

	Description	Quan	Unit	Unit Cost	Extension
	Mobilization	1	LS	$ 10,000.00	$ 10,000.00
	E and S Controls	1	LS	$ 1,000.00	$ 1,000.00
	Bypass pumping (see note 1)		LS	$ -	$ -
Demolition					
	Clean wet well	1	LS	$ 3,000.00	$ 3,000.00
	Remove existing pumps	1	LS	$ 2,000.00	$ 2,000.00
	Remove existing piping	1	LS	$ 2,000.00	$ 2,000.00
	Remove existing electric service	1	LS	$ 2,000.00	$ 2,000.00
Pumps, valves & piping					
	New T4 duplex suction lift pumps, CP, bubbler & Floats	1	LS	$ 57,670.00	$ 57,670.00
	4" Suction pipe	2	EA	$ 8,230.00	$ 16,460.00
	Paint pump and Piping	1	EA	$ 5,000.00	$ 5,000.00
	New 4" pump discharge piping to force main (GR pms)	1	LS	$ 7,900.00	$ 7,900.00
	Install magnetic flow meter in building	1	EA	$ 11,500.00	$ 11,500.00
Building					
	New pre-cast building (12x16x8)	1	LS	$ 18,499.00	$ 18,499.00
	Building 4" floor drain piping to wet well	1	LS	$ 7,010.00	$ 7,010.00
	Slab for building over wetwell	1	EA	$ 6,000.00	$ 6,000.00
	Exhaust fan and louvers	1	LS	$ 4,500.00	$ 4,500.00
	Install unit heater	1	EA	$ 2,030.00	$ 2,030.00
	Building outside lights	2	LS	$ 250.00	$ 500.00
	Install flouresent lights in building	6	EA	$ 250.00	$ 1,500.00
Wet Well					
	New wet well top w/ alum hatch, 4" pipe and 10" hole	1	LS	$ 5,190.00	$ 5,190.00
	Install screened vent	1	LS	$ 640.00	$ 640.00
	Install new drop Pipe	1	LS	$ 5,860.00	$ 5,860.00
Emergency Features					
	Install generator and ATS	1	LS	$ 56,980.00	$ 56,980.00
	Concrete slab for generator	1	LS	$ 4,000.00	$ 4,000.00
	Deck around generator	1	LS	$ 6,000.00	$ 6,000.00
	Install remote annunciation	1	LS	$ 3,840.00	$ 3,840.00
	Install 4" emergency pump connection	1	EA	$ 7,110.00	$ 7,110.00
	Install quick connect fittings on emergency discharge	1	LS	$ 960.00	$ 960.00
Safety/Security					
	Clear around back and sides of fence	1	LS	$ 3,500.00	$ 3,500.00
	Repair fence	1	LS	$ 3,000.00	$ 3,000.00
	Install new outside light	1	LS	$ 4,720.00	$ 4,720.00
Electrical					
	Conduit and wiring	1	LS	$ 25,000.00	$ 25,000.00
Site Work					
	Site grading	1	LS	$ 1,500.00	$ 1,500.00
	Seeding and mulching	1	LS	$ 800.00	$ 800.00
	Subtotal				*$ 287,669.00*
	Contractor Overhead and Profit	15	%		$ 43,150.35
	Total Estimated Construction Cost				*$ 330,819.35*
	Contingency	20	%		$ 66,163.87
	Engineering	12	%		$ 47,637.99
	Total Budget Estimate				**$ 444,700.00**

Notes:

1. Assume bypass pumping is by Prince George.

Pump Station Number 16
Prince George County Department of Public Utilities
Budgetary Cost Estimates
Attachment 16

Date: November 12, 2014

	Description	Quan	Unit	Unit Cost	Extension
	Mobilization	1	LS	$ 10,000.00	$ 10,000.00
	E and S Controls	1	LS	$ 1,000.00	$ 1,000.00
	Bypass pumping (see note 1)		LS	$ -	$ -
Demolition					
	Remove top section of wet well	1	LS	$ 1,500.00	$ 1,500.00
	Clean wet well	1	LS	$ 3,000.00	$ 3,000.00
	Remove existing pumps	1	LS	$ 2,000.00	$ 2,000.00
	Remove existing piping	1	LS	$ 2,000.00	$ 2,000.00
	Remove existing electric service	1	LS	$ 2,000.00	$ 2,000.00
Pumps, valves & piping					
	New T4 duplex suction lift pumps, CP, bubbler & Floats	1	LS	$ 57,670.00	$ 57,670.00
	4" Suction pipe	2	EA	$ 8,230.00	$ 16,460.00
	Paint pump and Piping	1	EA	$ 5,000.00	$ 5,000.00
	New 4" pump discharge piping to force main (GR pms)	1	LS	$ 7,900.00	$ 7,900.00
	Install 4" magnetic flow meter in building	1	EA	$ 11,500.00	$ 11,500.00
Building					
	New pre-cast building (12x16x8)	1	LS	$ 18,499.00	$ 18,499.00
	Building 4"floor drain piping to wet well	1	LS	$ 7,010.00	$ 7,010.00
	Slab for building over wetwell	1	EA	$ 6,000.00	$ 6,000.00
	Exhaust fan and louvers	1	LS	$ 4,500.00	$ 4,500.00
	Install unit heater	1	EA	$ 2,030.00	$ 2,030.00
	Building outside lights	2	EA	$ 250.00	$ 500.00
	Install flouresent lights in building	6	EA	$ 250.00	$ 1,500.00
Wet Well					
	New wet well top w/ alum hatch, 4" pipe and 10" hole	1	LS	$ 5,190.00	$ 5,190.00
	Install screened vent	1	LS	$ 640.00	$ 640.00
	Install new drop Pipe	1	LS	$ 5,860.00	$ 5,860.00
Emergency Features					
	Install generator and ATS	1	LS	$ 44,660.00	$ 44,660.00
	Concrete slab for generator	1	LS	$ 4,000.00	$ 4,000.00
	Deck around generator	1	LS	$ 6,000.00	$ 6,000.00
	Install remote annunciation (Raco + 3 year service)	1	LS	$ 3,840.00	$ 3,840.00
	Install quick connect fittings on emergency discharge	1	LS	$ 960.00	$ 960.00
Safety/Security					
	Repair fence	1	LS	$ 3,000.00	$ 3,000.00
	Install new outside light	1	LS	$ 4,720.00	$ 4,720.00
Electrical					
	Conduit and wiring	1	LS	$ 25,000.00	$ 25,000.00
Site Work					
	Site grading	1	LS	$ 2,000.00	$ 2,000.00
	Seeding and mulching	1	LS	$ 800.00	$ 800.00
	Subtotal				*$ 266,739.00*
	Contractor Overhead and Profit	15	%		$ 40,010.85
	Total Estimated Construction Cost				*$ 306,749.85*
	Contingency	20	%		$ 61,349.97
	Engineering	12	%		$ 44,171.98
	Total Budget Estimate				**$ 412,300.00**

Notes:
1. Assume bypass pumping is by Prince George.

Pump Station Number 17
Prince George County Department of Public Utilities
Budgetary Cost Estimates
Attachment 17

Date: November 12, 2014

	Description	Quan	Unit	Unit Cost	Extension
	Mobilization	1	LS	$ 10,000.00	$ 10,000.00
	E and S Controls	1	LS	$ 1,000.00	$ 1,000.00
	Bypass pumping (see note 1)		LS	$ -	$ -
Demolition					
	Demolish old pump station building	1	LS	$ 6,000.00	$ 6,000.00
	remove old building slab and wet well top	1	LS	$ 8,000.00	$ 8,000.00
	Clean wet well	1	LS	$ 3,000.00	$ 3,000.00
	Remove existing pumps	1	LS	$ 3,000.00	$ 3,000.00
	Remove existing piping	1	LS	$ 2,000.00	$ 2,000.00
	Remove existing electric service	1	LS	$ 2,000.00	$ 2,000.00
Pumps, valves & piping					
	New Duplex Ultra V series pumps, CP, bubbler & Floats	1	LS	$ 127,150.00	$ 127,150.00
	6" Suction pipe	2	EA	$ 9,440.00	$ 18,880.00
	New 4" pump discharge piping to force main (GR pms)	1	LS	$ 7,900.00	$ 7,900.00
	Paint pump and Piping	1	EA	$ 5,000.00	$ 5,000.00
	Install 4" magnetic flow meter in building	1	EA	$ 11,500.00	$ 11,500.00
Building					
	New pre-cast building (12x16x10)	1	LS	$ 23,124.00	$ 23,124.00
	Slab for building over wetwell	1	EA	$ 6,000.00	$ 6,000.00
	Exhaust fan and louvers	1	LS	$ 4,500.00	$ 4,500.00
	Install unit heater	1	EA	$ 2,030.00	$ 2,030.00
	Building outside lights	2	EA	$ 250.00	$ 500.00
	Install flouresent lights in building	6	EA	$ 250.00	$ 1,500.00
Wet Well					
	New wet well top w/ alum hatch, 4" pipe and 10" hole	1	LS	$ 5,190.00	$ 5,190.00
	Install screened vent	1	LS	$ 640.00	$ 640.00
	Install new drop Pipe	1	LS	$ 5,860.00	$ 5,860.00
Emergency Features					
	Install generator and ATS	1	LS	$ 56,980.00	$ 56,980.00
	Concrete slab for generator	1	LS	$ 4,000.00	$ 4,000.00
	Deck around generator	1	LS	$ 6,000.00	$ 6,000.00
	Install remote annunciation	1	LS	$ 3,840.00	$ 3,840.00
	Install emergency pump connection	1	LS	$ 7,110.00	$ 7,110.00
Safety/security					
	Install new outside light	1	LS	$ 4,720.00	$ 4,720.00
Electrical					
	Conduit and wiring	1	LS	$ 25,000.00	$ 25,000.00
Site Work					
	Site grading	1	LS	$ 3,000.00	$ 3,000.00
	Seeding and mulching	1	LS	$ 1,500.00	$ 1,500.00
	Subtotal				*$ 366,924.00*
	Contractor Overhead and Profit	15	%		$ 55,038.60
	Total Estimated Construction Cost				*$ 421,962.60*
	Contingency	20	%		$ 84,392.52
	Engineering	12	%		$ 60,762.61
	Total Budget Estimate				**$ 567,200.00**

Notes:

1. Assume bypass pumping is by Prince George.

Pump Station Number 18
Prince George County Department of Public Utilities
Budgetary Cost Estimates
Attachment 18

Date: November 12, 2014

Description	Quan	Unit	Unit Cost	Extension
Mobilization	1	LS	$ 5,000.00	$ 5,000.00
E and S Controls	1	LS	$ 1,000.00	$ 1,000.00
Bypass pumping (see note 1)		LS	$ -	$ -
Pumps, valves & piping				
New 4" rotating assemblies installed by GR	2	LS	$ 4,560.00	$ 9,120.00
Grout pump bases	1	LS	$ 800.00	$ 800.00
Recondition pump control panel	1	EA	$ 1,500.00	$ 1,500.00
Install new gages (by GR)	1	SET	$ 1,240.00	$ 1,240.00
Paint pump and Piping	1	EA	$ 4,000.00	$ 4,000.00
Install 4" magnetic flow meter in building	1	EA	$ 11,500.00	$ 11,500.00
Building				
Install new ss damper rain hood	2	EA	$ 1,000.00	$ 2,000.00
Install flouresent lights in building	6	EA	$ 250.00	$ 1,500.00
Building outside lights	2	LS	$ 250.00	$ 500.00
Repair exhaust pipe wall opening	1	EA	$ 500.00	$ 500.00
Install louvers for combustion air	1	LS	$ 19,140.00	$ 19,140.00
Install new doors	1	EA	$ 2,000.00	$ 2,000.00
Wet Well				
Install screened vent	1	LS	$ 300.00	$ 300.00
Install new drop Pipe	1	LS	$ 5,860.00	$ 5,860.00
Emergency Features				
Install remote annunciation (Raco + 3 year service)	1	LS	$ 3,840.00	$ 3,840.00
Install quick connect fittings on emergency discharge	1	LS	$ 960.00	$ 960.00
Safety/Security				
Install new outside light	1	LS	$ 4,720.00	$ 4,720.00
Electrical				
Conduit and wiring	1	LS	$ 8,000.00	$ 8,000.00
Site Work				
Install catch basin and patch pavement	1	LS	$ 6,000.00	$ 6,000.00
Seeding and mulching	1	LS	$ 800.00	$ 800.00
Subtotal				*$ 90,280.00*
Contractor Overhead and Profit	15	%		$ 13,542.00
Total Estimated Construction Cost				*$ 103,822.00*
Contingency	20	%		$ 20,764.40
Engineering	12	%		$ 14,950.37
Total Budget Estimate				**$ 139,600.00**

Notes:

1. Assume bypass pumping is by Prince George.

Pump Station Number 19
Prince George County Department of Public Utilities
Budgetary Cost Estimates
Attachment 19

Date: November 26, 2014

	Description	Quan	Unit	Unit Cost	Extension
	Mobilization	1	LS	$ 5,000.00	$ 5,000.00
	E and S Controls	1	LS	$ 1,000.00	$ 1,000.00
	Bypass pumping (see note 1)		LS	$ -	$ -
Pumps, valves & piping					
	New 4" rotating assemblies installed by GR	2	LS	$ 4,560.00	$ 9,120.00
	Grout pump bases	1	LS	$ 800.00	$ 800.00
	Recondition pump control panel	1	EA	$ 1,500.00	$ 1,500.00
	Install new gages on GR Duplex Pumps	1	SET	$ 1,240.00	$ 1,240.00
	Paint pump and Piping	1	EA	$ 4,000.00	$ 4,000.00
	Install 4" magnetic flow meter in building	1	LS	$ 11,500.00	$ 11,500.00
Building					
	repair louvers	1	LS	$ 600.00	$ 600.00
	Install new ss damper rain hood	2	EA	$ 1,000.00	$ 2,000.00
	Install flouresent lights in building	6	EA	$ 250.00	$ 1,500.00
	Building outside lights	2	EA	$ 250.00	$ 500.00
	Paint doors	1	EA	$ 500.00	$ 500.00
	Install new hinges	6	EA	$ 75.00	$ 450.00
	Install louvers for combustion air	1	LS	$ 19,140.00	$ 19,140.00
Wet Well					
	Install screened vent (no existing vent)	1	LS	$ 2,500.00	$ 2,500.00
Emergency Features					
	Install remote annunciation (Raco + 3 year service)	1	LS	$ 3,840.00	$ 3,840.00
	Install quick connect fittings on emergency suction	1	LS	$ 960.00	$ 960.00
	Install quick connect fittings on emergency discharge	1	LS	$ 960.00	$ 960.00
Safety/Security					
	Install new outside light	1	LS	$ 4,720.00	$ 4,720.00
Electrical					
	Conduit and wiring	1	LS	$ 8,000.00	$ 8,000.00
Site Work					
	Site remediation	1	LS	$ 1,500.00	$ 1,500.00
	Seeding and mulching	1	LS	$ 800.00	$ 800.00
	Subtotal				*$ 82,130.00*
	Contractor Overhead and Profit	15	%		$ 12,319.50
	Total Estimated Construction Cost				*$ 94,449.50*
	Contingency	20	%		$ 18,889.90
	Engineering	12	%		$ 13,600.73
	Total Budget Estimate				**$ 127,000.00**

Notes:
1. Assume bypass pumping is by Prince George.

Pump Station Number 20
Prince George County Department of Public Utilities
Budgetary Cost Estimates
Attachment 20

Date: November 12, 2014

Description	Quan	Unit	Unit Cost	Extension
Mobilization	1	LS	$ 5,000.00	$ 5,000.00
E and S Controls	1	LS	$ 1,000.00	$ 1,000.00
Bypass pumping (see note 1)		LS	$ -	$ -
Demolition				
Clean wet well	1	LS	$ 3,000.00	$ 3,000.00
Pumps, valves & piping				
New 4" rotating assemblies installed by GR	2	LS	$ 4,560.00	$ 9,120.00
Grout pump bases	1	LS	$ 800.00	$ 800.00
Recondition pump control panel	1	EA	$ 1,500.00	$ 1,500.00
Install new gages on GR Duplex Pumps	1	SET	$ 1,240.00	$ 1,240.00
Paint pump and Piping	1	EA	$ 4,000.00	$ 4,000.00
Install 4" magnetic flow meter in building	1	LS	$ 11,500.00	$ 11,500.00
Building				
Building outside lights	2	EA	$ 250.00	$ 500.00
Install flouresent lights in building	6	EA	$ 250.00	$ 1,500.00
Paint doors and frame	1	EA	$ 600.00	$ 600.00
Install stainless steel hinges	6	EA	$ 75.00	$ 450.00
Repair exhaust pipe wall opening	1	EA	$ 500.00	$ 500.00
Install louvers for combustion air	1	LS	$ 19,140.00	$ 19,140.00
Install new ss damper rain hood	2	EA	$ 1,000.00	$ 2,000.00
Wet Well				
Install screened vent	1	LS	$ 640.00	$ 640.00
Install new drop Pipe	1	LS	$ 5,860.00	$ 5,860.00
Emergency Features				
Install remote annunciation (Raco + 3 year service)	1	LS	$ 3,840.00	$ 3,840.00
Install quick connect fittings on emergency discharge	1	LS	$ 960.00	$ 960.00
Safety/Security				
Install new outside light	1	LS	$ 4,720.00	$ 4,720.00
Electrical				
Conduit and wiring	1	LS	$ 8,000.00	$ 8,000.00
Site Work				
Site remediation (repair MH cover)	1	LS	$ 2,000.00	$ 2,000.00
Seeding and mulching	1	LS	$ 800.00	$ 800.00
Subtotal				*$ 88,670.00*
Contractor Overhead and Profit	15	%		$ 13,300.50
Total Estimated Construction Cost				*$ 101,970.50*
Contingency	20	%		$ 20,394.10
Engineering	12	%		$ 14,683.75
Total Budget Estimate				**$ 137,100.00**

Notes:

1. Assume bypass pumping is by Prince George.

Pump Station Number 21
Prince George County Department of Public Utilities
Budgetary Cost Estimates
Attachment 21

Date: November 26, 2014

Description	Quan	Unit	Unit Cost	Extension
Mobilization	1	LS	$ 5,000.00	$ 5,000.00
E and S Controls	1	LS	$ 1,000.00	$ 1,000.00
Bypass pumping (see note 1)		LS	$ -	$ -
Demolition				
Clean wet well	1	LS	$ 3,000.00	$ 3,000.00
Pumps, valves & piping				
New 4" rotating assemblies installed by GR	2	LS	$ 4,560.00	$ 9,120.00
Grout pump bases	1	LS	$ 800.00	$ 800.00
Recondition pump control panel	1	EA	$ 1,500.00	$ 1,500.00
Install new gages on GR Duplex Pumps	1	SET	$ 1,240.00	$ 1,240.00
Install new air release valves and piping	2	EA	$ 800.00	$ 1,600.00
Paint pump and Piping	1	EA	$ 4,000.00	$ 4,000.00
Install magnetic flow meter in building	1	EA	$ 11,500.00	$ 11,500.00
Building				
Install flouresent lights in building	6	EA	$ 250.00	$ 1,500.00
Install louvers for combustion air	1	LS	$ 19,140.00	$ 19,140.00
Paint doors and frame	1	EA	$ 600.00	$ 600.00
Install stainless steel hinges	6	EA	$ 75.00	$ 450.00
Install new ss damper rain hood	2	EA	$ 1,000.00	$ 2,000.00
Wet Well				
Install screened vent	1	LS	$ 640.00	$ 640.00
Install new drop Pipe	1	LS	$ 5,860.00	$ 5,860.00
Emergency Features				
Install remote annunciation (Raco + 3 year service)	1	LS	$ 3,840.00	$ 3,840.00
Install quick connect fittings on emergency discharge	1	LS	$ 960.00	$ 960.00
Safety/Security				
New fence and Gate	160	FT	$ 40.00	$ 6,400.00
Install new outside light	1	LS	$ 4,720.00	$ 4,720.00
Electrical				
Conduit and wiring	1	LS	$ 8,000.00	$ 8,000.00
Site Work				
Site remediation	1	LS	$ 1,500.00	$ 1,500.00
Seeding and mulching	1	LS	$ 800.00	$ 800.00
Subtotal				*$ 95,170.00*
Contractor Overhead and Profit	15	%		$ 14,275.50
Total Estimated Construction Cost				*$ 109,445.50*
Contingency	20	%		$ 21,889.10
Engineering	12	%		$ 15,760.15
Total Budget Estimate				**$ 147,100.00**

Notes:
1. Assume bypass pumping is by Prince George.

Pump Station Number 22
Prince George County Department of Public Utilities
Budgetary Cost Estimates
Attachment 22

Date: November 26, 2014

	Description	Quan	Unit	Unit Cost	Extension
	Mobilization	1	LS	$ 5,000.00	$ 5,000.00
	E and S Controls	1	LS	$ 1,000.00	$ 1,000.00
	Bypass pumping (see note 1)		LS	$ -	$ -
Demolition					
	Clean wet well	1	LS	$ 3,000.00	$ 3,000.00
Pumps, valves & piping					
	New 4" rotating assemblies installed by GR	2	LS	$ 4,560.00	$ 9,120.00
	Grout pump bases	1	LS	$ 800.00	$ 800.00
	Recondition pump control panel	1	EA	$ 1,500.00	$ 1,500.00
	Install new gages on GR Duplex Pumps	1	SET	$ 1,240.00	$ 1,240.00
	Install new air release valves and piping	2	EA	$ 800.00	$ 1,600.00
	Paint pump and Piping	1	EA	$ 4,000.00	$ 4,000.00
	Install 4" magnetic flow meter in building	1	EA	$ 11,500.00	$ 11,500.00
Building					
	Install flouresent lights in building	6	EA	$ 250.00	$ 1,500.00
	Install louvers for combustion air	1	LS	$ 19,140.00	$ 19,140.00
	Paint doors and frame	1	EA	$ 600.00	$ 600.00
	Install new ss damper rain hood	2	EA	$ 1,000.00	$ 2,000.00
Wet Well					
	Install safety grating only	1	LS	$ 1,600.00	$ 1,600.00
	Install screened vent	1	LS	$ 640.00	$ 640.00
	Install new drop Pipe	1	LS	$ 5,860.00	$ 5,860.00
	Plug holes in wet top	1	LS	$ 1,500.00	$ 1,500.00
Emergency Features					
	Install remote annunciation (Raco + 3 year service)	1	LS	$ 3,840.00	$ 3,840.00
	Install quick connect fittings on emergency discharge	1	LS	$ 960.00	$ 960.00
Safety/Security					
	Install new outside light	1	LS	$ 4,720.00	$ 4,720.00
Electrical					
	Conduit and wiring	1	LS	$ 8,000.00	$ 8,000.00
Site Work					
	Site remediation	1	LS	$ 1,500.00	$ 1,500.00
	removing vegetation around fence	1	LS	$ 2,000.00	$ 2,000.00
	Seeding and mulching	1	LS	$ 800.00	$ 800.00
	Subtotal				*$ 93,420.00*
	Contractor Overhead and Profit	15	%		$ 14,013.00
	Total Estimated Construction Cost				*$ 107,433.00*
	Contingency	20	%		$ 21,486.60
	Engineering	12	%		$ 15,470.35
	Total Budget Estimate				**$ 144,400.00**

Notes:
1. Assume bypass pumping is by Prince George.

Pump Station Number 23
Prince George County Department of Public Utilities
Budgetary Cost Estimates
Attachment 23

Date: November 26, 2014

Description	Quan	Unit	Unit Cost	Extension
Mobilization	1	LS	$ 2,000.00	$ 2,000.00
Bypass pumping (see note 1)		LS	$ -	$ -
Demolition				
Clean wet well	1	LS	$ 3,000.00	$ 3,000.00
Pumps, valves & piping				
Revise pump speed (new belts and sheaves by GR)	2	EA	$ 750.00	$ 1,500.00
Building				
Paint doors	1	LS	$ 600.00	$ 600.00
Wet Well				
Install safety grating only	1	LS	$ 1,600.00	$ 1,600.00
Install mixer	1	LS	$ 10,040.00	$ 10,040.00
Emergency Features				
Install remote annunciation (Raco + 3 year service)	1	LS	$ 3,840.00	$ 3,840.00
Install quick connect fittings on emergency suction	1	LS	$ 960.00	$ 960.00
Install quick connect fittings on emergency discharge	1	LS	$ 960.00	$ 960.00
Subtotal				*$ 24,500.00*
Contractor Overhead and Profit	15	%		$ 3,675.00
Total Estimated Construction Cost				*$ 28,175.00*
Contingency	20	%		$ 5,635.00
Engineering	12	%		$ 4,057.20
Total Budget Estimate				**$ 37,900.00**

Notes:

1. Assume bypass pumping is by Prince George.

Pump Station Number 24
Prince George County Department of Public Utilities
Budgetary Cost Estimates
Attachment 24

Date: November 12, 2014

Description	Quan	Unit	Unit Cost	Extension
Mobilization	1	LS	$ 5,000.00	$ 5,000.00
E and S Controls	1	LS	$ 1,000.00	$ 1,000.00
Bypass pumping (see note 1)		LS	$ -	$ -
Pumps, valves & piping				
Install 4" magnetic flow meter in building	1	LS	$ 11,500.00	$ 11,500.00
Emergency Features				
Install generator and ATS	1	LS	$ 56,980.00	$ 56,980.00
Concrete slab for generator	1	LS	$ 4,000.00	$ 4,000.00
Deck around generator	1	LS	$ 6,000.00	$ 6,000.00
Install remote annunciation (Raco + 3 year service)	1	LS	$ 3,840.00	$ 3,840.00
Install quick connect fittings on emergency suction	1	LS	$ 960.00	$ 960.00
Install quick connect fittings on emergency discharge	1	LS	$ 960.00	$ 960.00
Safety/Security				
Install new outside light	1	LS	$ 4,720.00	$ 4,720.00
Electrical				
Conduit and wiring	1	LS	$ 20,000.00	$ 20,000.00
Relocate junction box on wet well top	1	LS	$ 1,200.00	$ 1,200.00
Site Work				
Site remediation	1	LS	$ 1,500.00	$ 1,500.00
Seeding and mulching	1	LS	$ 800.00	$ 800.00
Subtotal				*$ 118,460.00*
Contractor Overhead and Profit	15	%		$ 17,769.00
Total Estimated Construction Cost				*$ 136,229.00*
Contingency	20	%		$ 27,245.80
Engineering	12	%		$ 19,616.98
Total Budget Estimate				**$ 183,100.00**

Notes:

1. Assume bypass pumping is by Prince George.

Dewberry

TECHNICAL MEMORANDUM

Date: December 16, 2014

To: Chip England, P.E.

From: Dan Villhauer, PE

Subject: Prince George County Water and Wastewater Facilities Condition Assessment

Water Facilities

BACKGROUND

Prince George County (County) owns and operates water supply, storage, and distribution facilities within eight (8) different water systems. Dewberry was tasked to work with County staff to complete a general condition assessment of each water facility and provide a budget cost estimate for the recommended improvements. The following tasks were completed to develop these budget-level cost estimates:

- Conducted site visits to the respective facilities to review existing conditions and proposed upgrades;
- Contacted suppliers, manufacturers, and manufacturers' representatives to obtain budget pricing for major equipment components;
- Reviewed contractor pricing and bid information from previous similar projects;
- Developed independent budget-level construction cost estimates for each facility

The following represents an overview of the condition assessment of each facility, associated budget cost estimates, and recommended prioritization for each evaluated maintenance/upgrade alternative.

WATER FACILITY EVALUATION

The following includes a summary of each water facility with listed deficiencies, recommended corrective actions, and a budget cost estimate. Deficiencies for each pump station were divided into two categories: critical and secondary.

Middle Road Booster Station

The booster station serves to pump water from the Appomattox River Water Authority (ARWA) connection to the central water system. The station consists of 3 - 50 hp Aurora end suction centrifugal pumps located in a ribbed block building with a wood framed roof and metal roofing. A water meter is located in a meter vault outside of the building. The facility includes a 200KW diesel generator and automatic transfer switch (ATS) for backup.

Based on available records, the pump station was constructed in 1988.

The following deficiencies were noted during the site visit:

Critical Deficiencies:

1. *Deficiency:* No remote annunciation.
   Action: Install remote annunciation system to monitor system and provide alarms.

2. *Deficiency:* Meter bypass is inoperable.

Action: Investigate reason and implement a solution as needed. Since the reason for the bypass being inoperable is unknown, a $10,000 budget placeholder was included in the budget cost estimate.

3. *Deficiency:* Sample taps are not threadless.
   Action: Install threadless sample tap.

4. *Deficiency:* No surge relief valve.
   Install surge relief valve and pipe discharge to outside of building.

5. *Deficiency:* Bermad pump control pilot system is discharging to floor. Opening and closing speed of valve does not appear to be correct.

   Action: Obtain manufacturer's representative to inspect valve operation and make repairs necessary to provide the correct operation of the valve.

6. *Deficiency:* Ventilation intake louvers not working.
   Action: Repair dampers.

Secondary Deficiencies:

7. *Deficiency:* No pump automated control.
   Action: Install a system to provide the following:

   a. Control pumps by tank level.
   b. Monitor system pressures
   c. Monitor pump run time
   d. Provide alarms
   e. Monitor water meter
   f. Monitor building temperature

8. *Deficiency:* Pressure gauges inoperable.
   Action: Replace pressure gauges.

9. *Deficiency:* Ceiling insulation is falling down and missing in some areas.
   Action: Repair insulation and install a marine board ceiling with hatch to access attic space.

10. *Deficiency:* Ceiling insulation shows indications of water damage.
    Action: Confirm roof is presently not leaking and repair damaged insulation.

11. *Deficiency:* Check valve shaft stuffing glands leaking.
    Action: Install new packing in shaft glands.

12. *Deficiency:* Pipe coating in fair condition, requires painting.
    Action: Paint pumps, valves and piping.

13. *Deficiency:* Meter vault pipe coating in fair condition, requires painting.
    Action: Paint piping.

14. *Deficiency:* Pipe supports require repair.
    Action: Replace bad pipe support.

Middle Road Elevated Water Storage Tank

This elevated water storage tank has a nominal volume of 500,000 gallons and is filled by the Middle Road Booster Pump Station. The elevated tank has an altitude valve located in a valve vault with an aluminum access hatch.

Based on available records, the elevated water storage tank was constructed in 2002.

The following deficiencies were noted during the site visit:

Critical Deficiencies:

1. *Deficiency:* Sample taps are not threadless.
   Action: Install threadless sample taps.
2. *Deficiency:* Cathodic Protection Maintenance
   Action: Provide cathodic protection manufacturer to provide yearly maintenance.

Secondary Deficiencies:

3. *Deficiency:* No SCADA system
   Action: Install a SCADA system to allow for remote indication and trending of tank level. The budget cost estimate assumes that the SCADA system will be installed at the same time for the Middle Road Booster Pump Station and the three elevated tanks within the Central Water System as part of the same project.
4. *Deficiency:* Altitude valve is out of service.
   Action: Provide manufacturer's representative to inspect and make repairs as required.
5. *Deficiency:* Freeze protection structure is temporary.
   Action: Provide permanent enclosure, insulation and heat for freeze protection.
6. *Deficiency:* No security around site.
   Action: Install fence and gate.

Courthouse Elevated Water Storage Tank

This elevated water storage tank has a nominal volume of 500,000 gallons and is filled by the Middle Road Booster Pump Station. The elevated tank has an altitude valve located in a valve vault with an aluminum access hatch.

Based on available records, the elevated water tank was constructed in 1988.

The following deficiencies were noted during the site visit:

Critical Deficiencies:

1. *Deficiency:* Sump is a safety issue.
   Action: Install grating over sump.

2. *Deficiency:* Overflow and tank drain piping outside is inadequately supported and flange on drain is broken.
   Action: Provide new supports and repair broken pipe. Paint pipe.

3. *Deficiency:* Cell phone cable entrance through wall not sealed
   Action: Seal opening.

4. *Deficiency:* Sample taps are not threadless.
   Action: Install threadless samples taps.

5. *Deficiency:* Cathodic Protection Maintenance
   Action: Provide cathodic protection manufacturer to provide yearly maintenance.

Secondary Deficiencies:

6. *Deficiency:* No SCADA system
   Action: Install a SCADA system to allow for remote indication and trending of tank level. The budget cost estimate assumes that the SCADA system will be installed at the same time for the Middle Road Booster Pump Station and the three elevated tanks within the Central Water System as part of the same project.

7. *Deficiency:* Sump is filled with dirt and debris.
   Action: Remove dirt and clean sump.

8. *Deficiency:* Piping in sump requires painting
   Action: Clean and paint pipe in sump.

9. *Deficiency:* Tank base inside is rusting.
   Action: Clean and paint.

10. *Deficiency:* Miscellaneous portions of the piping is rusting.
    Action: Clean and paint.

11. *Deficiency:* Floor of tank base is dirt.
    Action: Install concrete floor.

12. *Deficiency:* Check operation of Altitude valve
    Action: Provide manufacturer's representative to inspect and make repairs and adjustments as required.

13. *Deficiency:* Freeze protection structure is temporary.
    Action: Provide permanent enclosure, insulation and heat for freeze protection.

Crosspointe Elevated Water Storage Tank

This elevated water storage tank has a nominal volume of 500,000 gallons and is filled by the Middle Road Booster Pump Station. The elevated tank has an altitude valve located in a valve vault with an aluminum access hatch.

Based on available records, the elevated water tank was constructed in 2000.

The following deficiencies were noted during the site visit:

Critical Deficiencies:

1. *Deficiency:* Sample taps are not threadless.
   Action: Install threadless sample taps.

2. *Deficiency:* Cathodic Protection Maintenance.
   Action: Provide cathodic protection manufacturer to provide yearly maintenance.

Secondary Deficiencies:

3. *Deficiency:* No SCADA system
   Action: Install a SCADA system to allow for remote indication and trending of tank level. The budget cost estimate assumes that the SCADA system will be installed at the same time for the Middle Road Booster Pump Station and the three elevated tanks within the Central Water System as part of the same project.

4. *Deficiency:* Piping in sump requires painting
   Action: Clean and paint pipe in sump.

5. *Deficiency:* Altitude valve is not required, presently not in service, running on bypass.
   Action: None at this time.

6. *Deficiency:* Freeze protection structure is temporary.
   Action: Provide permanent enclosure, insulation and heat for freeze protection.

7. *Deficiency:* Altitude valve vault contains water.
   Action: Install sump and sump pump.

8. *Deficiency:* Pipe, and valves in Altitude valve vault rusting.
   Action: Clean and paint pipe and valves.

Richard Bland College Elevated Water Storage Tank

This elevated water storage tank has a nominal volume of 500,000 gallons includes a booster pump station in the center column transfer water from the connection at the City of Petersburg.

Based on available records, the elevated water tank was constructed in 2008.

The following deficiencies were noted during the site visit:

Critical Deficiencies:

1. *Deficiency:* Sample taps are not threadless.
   Action: Install threadless sample taps.

2. *Deficiency:* Cathodic Protection Maintenance.
   Action: Provide cathodic protection manufacturer to provide yearly maintenance.

3. *Deficiency:* Pump control panel not working correctly.
   Action: Provide control panel manufacturer to inspect, repair and adjust as required.

Secondary Deficiencies:

4. *Deficiency:* No SCADA system
   Action: Install a SCADA system to allow for remote indication and trending of tank level. The budget cost estimate assumes that the SCADA system will be installed at the same time as for the Central Water System.

5. *Deficiency:* Freeze protection structure is temporary.
   Action: Provide permanent enclosure, insulation and heat for freeze protection around booster pumps and piping.

6. *Deficiency:* County does not own their own flow meter.
   Action: Install magnetic flow meter in manhole on pump suction piping.

Route 301 Elevated Water Storage Tank

This elevated water storage tank has a nominal volume of 500,000 gallons and is filled by two groundwater wells within the Route 301 water service area. The elevated tank has an altitude valve located in a valve vault with an aluminum access hatch.

Based on available records, the elevated water tank was constructed in 2007.

The following deficiencies were noted during the site visit:

Critical Deficiencies:

1. *Deficiency:* Cathodic Protection Maintenance
   Action: Provide cathodic protection manufacturer to provide yearly maintenance.

2. *Deficiency:* Sample taps are not threadless.
   Action: Install threadless sample taps.

Secondary Deficiencies:

7. *Deficiency:* No SCADA system
   Action: Install a SCADA system to allow for remote indication and trending of tank level. The budget cost estimate assumes that the SCADA system will be installed at the same time as for the Central Water System.

3. *Deficiency:* Piping in sump requires painting
   Action: Clean and paint pipe in sump.

4. *Deficiency:* Check operation of Altitude valve
   Action: Provide manufacturer's representative to inspect and make repairs as required.

5. *Deficiency:* Freeze protection structure is temporary.
   Action: Provide permanent enclosure, insulation and heat for freeze protection around booster pumps and piping.

6. *Deficiency:* Pipe, and valves in Altitude valve vault rusting.
   Action: Clean and paint pipe and valves.

Pumpkins/Days Inn Water Facility

This water facility consists of a well, atmospheric storage tank (not used), softening system, sodium hypochlorite feed system and hydro-pneumatic tank. The well head and all the equipment are located in a block and brick building with a wood framed and shingled roof.

Based on available records, the water facility was constructed in 1987.

The following deficiencies were noted during the site visit:

Critical Deficiencies:

1. *Deficiency:* No remote annunciation.
   Action: Install remote annunciation to monitor system and provide alarms

2. *Deficiency:* Open sump is a safety issue.
   Action: Install grating over sump.

3. *Deficiency:* Sample taps are not threadless.
   Action: Install threadless sample taps.

4. *Deficiency:* No containment around chlorination system.
   Action: Install fiberglass chemical containment deck

Secondary Deficiencies

5. *Deficiency:* No generator and ATS
   Action: Install generator and ATS

6. *Deficiency:* Building doors rusting out on bottom.
   Action: Install new doors and paint.

7. *Deficiency:* Insulation in poor condition on outside pipe to residential customer
   Action: Reinsulate, heat trace, install metal jacket to 16" below ground.

8. *Deficiency:* Hydro tank maintenance.
   Action: Checkout operation and provide required controls for automatic operation.

9. *Deficiency:* Block wall at hydro tank missing blocks.
   Action: Complete masonry of wall.

10. *Deficiency:* No security around site.
    Action: Install fence and gate.

11. *Deficiency:* No eye wash.
    Action: Install self-contained eye wash.

12. *Deficiency:* Interior building lighting poor
    Action: Install fluorescent fixtures.

13. *Deficiency:* Water appears to be very hard.
Action: Investigate and confirm, check function of water softeners.

Hampton Inn Water Facility

This water system consists of a well, bolted steel atmospheric storage tank, softening system, sodium hypochlorite system, booster pumps and hydro-pneumatic tank. The atmosphere tank is sized for fire protection and has its own generator and fire pump for fire only. The well head is located outside with a pitless adaptor. All other equipment is located in a pre-cast concrete building.

Based on available records, the water facility was constructed in 1988.

The following deficiencies were noted during the site visit:

Critical Deficiencies:

1. *Deficiency:* Hydro-pneumatic tank in very poor condition
Action: Remove hydro-tank from service and install SCADA system for automatic pump control based on the Route 301 elevated tank level.

2. *Deficiency:* No remote annunciation.
Action: Use SCADA system installed for automatic pump control for remote annunciation.

3. *Deficiency:* All sample taps are not threadless.
Action: Install threadless sample taps.

4. *Deficiency:* Pipe supports on softener piping inadequate.
Action: Provide additional pipe supports where required.

5. *Deficiency:* No security around well head
Action: Install fence and gate.

6. *Deficiency:* No containment around chlorination system.
Action: Install fiberglass chemical containment deck

Secondary Deficiencies

7. *Deficiency:* No generator and ATS for domestic water system.
Action: Install generator and ATS

8. *Deficiency:* Building doors require maintenance.
Action: Install new door hinges, paint doors and repair door astragal.

9. *Deficiency:* Insulation on pipes between storage tank and well house damaged.
Action: Repair insulation and re-jacket.

10. *Deficiency:* Ventilation dampers exposed to weather.
Action: Install stainless steel weather hoods over dampers.

11. *Deficiency:* Water appears to be very hard.
Action: Investigate and confirm, check function of water softeners.

Beechwood Manor/Lemonwood Water Facility

This water system consists of a well, softening system, sodium hypochlorite feed system, underground concrete atmospheric storage tank, booster pumps, and hydro-pneumatic tank. The atmospheric tank is concrete with a wood framed roof with metal roofing. The well head, sodium hypochlorite feed system, and softening system is housed in one building and the booster pumps and hydro-pneumatic tank is housed in another building. A propane generator exists for emergency backup with a manual transfer switch.

Based on available records, the softening system was installed recently. The well, tanks, and booster station was installed in 1975.

The following deficiencies were noted during the site visit:

Critical Deficiencies:

1. *Deficiency:* No remote annunciation.
Action: Install remote annunciation to monitor system and provide alarms

2. *Deficiency:* Hydro tank is in bad shape – leaking at seams
Action: Replace hydro tank with a tank not being used and install controls for automatic operation.

3. *Deficiency:* Sample taps are not threadless.
Action: Install threadless sample taps.

4. *Deficiency:* No containment around chlorination system.
Action: Install fiberglass chemical containment deck

Secondary Deficiencies:

5. *Deficiency:* Buildings in general require maintenance.
Action: Provide the following:

    a. Replace all rotten wood
    b. Paint exterior wood and siding
    c. Paint outside of block building.

6. *Deficiency:* Concrete for atmospheric tank has deteriated on the outside.
Action: Provide concrete repair

7. *Deficiency:* Pump seal leaking on Pump No.2.
Action: Repair pump seal.

8. *Deficiency:* No suction or discharge pressure gages on pumps.
Action: Install pressure gages.

9. *Deficiency:* Electrical disconnect at floor level rusting.

Action: Replace and relocate to a higher level.

10. *Deficiency:* Carbon steel pipe in system rusting
Action: Replace all carbon steel pipe with galvanized or ductile iron.

11. *Deficiency:* Pump, pipe and valve coating deteriorated.
Action: Replace rusty bolts and paint piping.

12. *Deficiency:* Hydraulic relief valve on hydro tank not in service.
Action: Remove from system. Install mechanical relief valve, pipe to outside

13. *Deficiency:* No forced ventilation system in pump building.
Action: Install exhaust fan dampers and louvers.

14. *Deficiency:* Vegetation encroaching on fence.
Action: Clear

15. *Deficiency:* Fence is in poor shape
Action: Install new fence and gate.

16. *Deficiency:* Area inside fence requires grading.
Action: Clear and grade.

17. *Deficiency:* Electrical junction boxes are without covers.
Action: Install all covers

18. *Deficiency:* No ATS
Action: Replace manual TS with ATS. Add auto-start to generator.

Cedar Wood Water Facility

This water system consists of a well, horizontal atmospheric storage tank, booster pumps, and hydro-pneumatic tank. The atmosphere tank is located outside adjacent to the well building. The well head and all other equipment are located in a CMU building with a wood framed roof.

Based on available records, the water system was installed in 1982.

The following deficiencies were noted during the site visit:

Critical Deficiencies:

1. *Deficiency:* No remote annunciation.
Action: Install remote annunciation to monitor system and provide alarms.
2. *Deficiency:* Sample taps are not threadless.
Action: Install threadless sample taps.

Secondary Deficiencies:

3. *Deficiency:* No generator and ATS
Action: Install generator and ATS

4. *Deficiency:* Hydro tank maintenance.
   Action: Checkout operation and provide required controls for automatic operation.

5. *Deficiency:* No suction or discharge pressure gages on pumps.
   Action: Install pressure gages.

6. *Deficiency:* No forced ventilation system.
   Action: Install exhaust fan dampers and louvers.

7. *Deficiency:* Insulation on pipes between storage tank and well house damaged.
   Action: Repair insulation and re-jacket.

Food Lion Water Facility

This water system consists of a well, 1,000,000 gallon welded steel atmospheric storage tank, sodium hypochlorite feed system, booster pumps, and hydro-pneumatic tank. The atmosphere tank is located outside adjacent to the well building. The well head, hydro-pneumatic tank, and booster pumps are located in a CMU building with a wood framed asphalt shingles roof. The facility includes a diesel generator with an automatic transfer switch for emergency backup.

Based on available records, the water facility was constructed in 1982.

The following deficiencies were noted during the site visit:

Critical Deficiencies:

1. *Deficiency:* No remote annunciation.
   Action: Install remote annunciation to monitor system and provide alarms.

2. *Deficiency:* Sample taps are not threadless.
   Action: Install threadless hose bibs

3. *Deficiency:* No access prevention on tank ladder.
   Action: Install ladder guard with lock.

4. *Deficiency:* No containment around chlorination system.
   Action: Install fiberglass chemical containment deck

Secondary Deficiencies:

5. *Deficiency:* Existing diesel generator not easily accessible for maintenance.
   Action: Install platform around generator.

6. *Deficiency:* Pump house building and well building require maintenance.
   Action: Make the following repairs:

   a. New siding on eves
   b. Replace rotten wood
   c. Paint doors or replace with new
   d. Paint outside and inside of block walls

e. Paint ceiling.

7. *Deficiency:* Hydro tank maintenance.
Action: Lower water level float to midpoint of tank to provide better pump cycling. Checkout controls for automatic operation. Replace pressure switches as required.

8. *Deficiency:* Pump seal leaking.
Action: Repair pump seal.

9. *Deficiency:* No suction or discharge pressure gages on pumps.
Action: Install pressure gages.

10. *Deficiency:* No forced ventilation in pump house and well house
Install exhaust fan, dampers and louvers.

11. *Deficiency:* Deficient pipe supports on 4" ductile iron pipe.
Action: Provide additional pipe supports where required.

12. *Deficiency:* Electrical repairs required.
Action: Make repairs as follows:

a. Remove abandoned wire and conduit
b. Repair conduit were wire exposed
c. Install all covers on junction boxes

13. *Deficiency:* Pipe coating in well house is in fair condition
Action: Clean and paint piping

14. *Deficiency:* Vehicle access to building is poor.
Action: Add stone in front of building for parking and access.

15. *Deficiency:* Blow off is capped.
Action: Remove cap, install screened elbow and concrete pad.

16. *Deficiency:* Based upon tank operation, it is assumed there is insufficient mixing within the tank
Action: Install tank mixer.

Jordan on the James Water Facility

This water system consists of a well, underground concrete atmospheric storage tank, greensand filters, sodium hypochlorite feed system, booster pumps and hydro-pneumatic tank. The underground atmosphere tank is concrete with a wood framed roof and metal roofing. The well head and all other equipment is located in a wood framed building with an asphalt shingled roof. A generator exists in a separate building for emergency backup with an automatic transfer switch.

Based on available records, the system was installed in 1986.

The following deficiencies were noted during the site visit:

Critical Deficiencies:

Well Building

1. *Deficiency:* No remote annunciation.
   Action: Install remote annunciation to monitor system and provide alarms.

2. *Deficiency:* No forced ventilation in well house
   Action: Install exhaust fan, dampers and louvers.

3. *Deficiency:* High humidity in well house.
   Action: Install dehumidifier.

4. *Deficiency:* Sample taps are not threadless.
   Action: Install threadless sample taps.

5. *Deficiency:* Carbon steel pipe in system rusting.
   Action: Replace all carbon steel pipe with galvanized or ductile iron.

6. *Deficiency:* Green sand filter tanks, piping, and valving are in poor condition.
   Action: Evaluate condition of tanks. Based on age and condition of the filtration system the budget estimate assumed the installation of a new filter skid.

7. *Deficiency:* Pipe supports on piping inadequate.
   Action: Provide additional pipe supports where required. Remove clevis hanger supports and support pipes from the floor. Remove deteriorated supports and install new.

8. *Deficiency:* MCC rusting at bottom
   Action: Replace MCC with a new unit. Install on equipment pad.

9. *Deficiency:* No containment around chlorination system.
   Action: Install fiberglass chemical containment deck

10. *Deficiency:* No eye wash.
    Action: Install self-contained eye wash.

Secondary Deficiencies:

Generator Building

11. *Deficiency:* Inadequate air intake for generator in generator building.
    Action: Reinstall original louvers with dampers and make operational.

12. *Deficiency:* Main power service electrical enclosures rusting.
    Action: Clean and paint.

13. *Deficiency:* Generator building interior gypsum board and insulation missing.
    Action: Repair

Well Building

14. *Deficiency:* Building ceil is open and missing insulation.
    Action: Provide the following:

a. Ceiling insulation
b. Hatch for attic space
c. Install marine board ceiling

15. *Deficiency:* Hydro tank maintenance.
Action: Checkout operation and repair/replace required controls for automatic operation.

16. *Deficiency:* No suction or discharge pressure gages on pumps.
Action: Install pressure gages.

17. *Deficiency:* Pump, pipe and valve coating deteriorated.
Action: Replace rusty bolts and paint piping.

18. *Deficiency:* Hot water heater leaking.
Action: Replace hot water heater and provide adequate pipe supports on inlet and outlet piping.

19. *Deficiency:* Sink and counter in poor condition
Action: Install stainless steel sink and counter.

20. *Deficiency:* Double doors to facility poor condition.
Action: Replace doors, relocate ventilation fan.

Ground Storage Tank

21. *Deficiency:* Wood on storage tank enclosure deteriorated.
Action: Replace all rotten wood and paint.

22. *Deficiency:* Void spaces in soil around concrete containment.
Action: Fill in all voids and compact.

Ground Storage Tank

23. *Deficiency:* No security around site.
Action: Install fence and gate.

Prince George Woods Water Facility

This water system consists of a well, softening system, and hydro-pneumatic tank. Well head and hydro-pneumatic tank controls are located a CMU building with a pre-cast concrete roof.

Based on available records, the well system was installed in 1972 and the softening system was installed recently.

The following deficiencies were noted during the site visit:

Critical Deficiencies:

1. *Deficiency:* No remote annunciation.
   Action: Install remote annunciation to monitor system and provide alarms.

2. *Deficiency:* Sample taps are not threadless.
   Action: Install threadless sample taps.

Secondary Deficiencies:

1. *Deficiency:* No generator and ATS
   Action: Install generator and ATS

2. *Deficiency:* Building door bottom rusted out.
   Action: Install door and paint.

3. *Deficiency:* No forced ventilation in pump house and well house
   Install exhaust fan, dampers and louvers.

4. *Deficiency:* Hydro tank maintenance.
   Action: Checkout operation and provide required controls for automatic operation.

5. *Deficiency:* Hydro-tank coating in poor condition.
   Action: Paint tank

6. *Deficiency:* Interior lighting poor
   Action: Install fluorescent lights

7. *Deficiency:* No security around site.
   Action: Install fence and gate.

Bicors Drive – Rivers Edge Water Facility

This water system consists of a well, horizontal atmospheric storage tank for fire protection and hydro-pneumatic tank. The atmosphere tank is located outside adjacent to the well building. The well head and hydro-pneumatic controls are located in a wood framed building with a wood framed roof. The site is enclosed by a chain link fence.

Based on available records, the water facility was constructed in 1962.

The following deficiencies were noted during the site visit:

Critical Deficiencies:

1. *Deficiency:* No remote annunciation.
   Action: Install Raco remote annunciation to monitor system and provide alarms.

2. *Deficiency:* Sample taps are not threadless.
   Action: Install threadless sample taps.

3. *Deficiency:* Hydro tank is in bad shape – appears to be leaking.
   Action: Replace hydro tank and install controls for automatic operation.

Secondary Deficiencies:

4. *Deficiency:* No generator and ATS
   Action: Install generator and ATS

5. *Deficiency:* No forced ventilation in pump house and well house
   Install exhaust fan, dampers and louvers.

6. *Deficiency:* Atmospheric tank maintenance.
   Action: Sandblast and paint.

7. *Deficiency:* Insulation on pipe from atmospheric tank to building requires repair.
   Action: Replace bad insulation and install new aluminum jacket.

8. *Deficiency:* Building floor drain piping at building exterior broken.
   Action: Replace piping and install screen on discharge.

9. *Deficiency:* Interior lighting poor
   Action: Install fluorescent lights

Liverman Drive – Rivers Edge Water Facility

This water system consists of a well and hydro-pneumatic tank. The well head and hydro-pneumatic controls are located in a block and brick building with a wood framed asphalt shingled roof. The well pumps directly into the hydro-pneumatic tank.

Based on available records, the system was installed in 1973.

The following deficiencies were noted during the site visit:

Critical Deficiencies:

1. *Deficiency:* No remote annunciation.
   Action: Install remote annunciation to monitor system and provide alarms.

Secondary Deficiencies:

2. *Deficiency:* No generator and ATS.
   Action: Install generator and ATS.

3. *Deficiency:* No forced ventilation in pump house and well house.
   Install exhaust fan, dampers and louvers.

4. *Deficiency:* Interior lighting poor.
   Action: Install fluorescent lights.

5. *Deficiency:* Interior wall board missing.
   Action: Add missing wall board.

6. *Deficiency:* Exposed wires.
   Action: Perform minor electrical repairs.

Water Facility Budget Cost Estimates

Budgetary level cost estimates were developed for the improvements recommended for each water facility as shown in the table below. Refer to **Attachments 1 - 15** for a detailed breakdown of the budgetary cost estimates.

Water Facility Budgetary Cost Estimates Summary

Name	Budgetary Cost Estimate
Middle Road Booster Station	$ 135,000
Middle Road Elevated Water Storage Tank	$ 32,000
Courthouse Elevated Water Storage Tank	$ 89,000
Crosspointe Elevated Water Storage Tank	$ 41,000
Richard Bland College Elevated Water Storage Tank	$ 66,000
Route 301 Elevated Water Storage Tank	$ 39,000
Pumpkins/Days Inn Water Facility	$ 126,000
Hampton Inn Water Facility	$ 147,000
Beechwood Manor/Lemonwood Water Facility	$ 136,000
Cedar Wood Water Facility	$ 100,000
Food Lion Water Facility	$ 170,000
Jordan on the James Water Facility	$ 277,000
Prince George Woods Water Facility	$ 94,000
Bicors Drive - Rivers Edge Water Facility	$ 163,000
Liverman Drive - Rivers Edge Water Facility	$ 62,000

All cost estimates are based on unit prices from similar projects and recent cost estimating data. All present costs are based on the October 2014 construction cost index from Engineering News Record. To determine the appropriate costs of these projects in future years, the Engineering News Record Construction Cost Index should be used as follows:

Future Cost = Present Cost x (Future Cost Index / Present Cost Index)

CONCLUSIONS AND RECOMMENDATIONS

Based on the results of this analysis, a significant amount of work will be required to recondition the County's water facilities. In order to assist in prioritizing upgrades and in order to spread the costs over a longer period of time, the water facility improvements were categorized based on criticality of the deficiencies for each water facility.

It is recommended that all the critical items be completed within the next 5 years. Some of the secondary issues are minor maintenance items that the County could most likely complete in-house. It is recommended that the low cost secondary items be completed within the next 5 to 10 years as budget allows.

Attachments:

1. Middle Road Booster Station – Budgetary Cost Estimate Breakout
2. Middle Road Elevated Water Storage Tank – Budgetary Cost Estimate Breakout
3. Courthouse Elevated Water Storage Tank – Budgetary Cost Estimate Breakout
4. Crosspointe Elevated Water Storage Tank – Budgetary Cost Estimate Breakout
5. Richard Bland College Elevated Water Storage Tank – Budgetary Cost Estimate Breakout
6. Route 301 Elevated Water Storage Tank – Budgetary Cost Estimate Breakout
7. Pumpkins/Days Inn Water Facility – Budgetary Cost Estimate Breakout
8. Hampton Inn Water Facility – Budgetary Cost Estimate Breakout
9. Beechwood Manor/Lemonwood Water Facility – Budgetary Cost Estimate Breakout
10. Cedar Wood Water Facility – Budgetary Cost Estimate Breakout
11. Food Lion Water Facility – Budgetary Cost Estimate Breakout
12. Jordan on the James Water Facility – Budgetary Cost Estimate Breakout
13. Prince George Woods Water Facility – Budgetary Cost Estimate Breakout
14. Bicors Drive - Rivers Edge Water Facility – Budgetary Cost Estimate Breakout
15. Liverman Drive - Rivers Edge Water Facility – Budgetary Cost Estimate Breakout

Middle Road Booster Station
Prince George County Department of Public Utilities
Budgetary Cost Estimates
Attachment 1W

Date: December 16, 2014

Description	Quan	Unit	Unit Cost	Extension
Mobilization	1	LS	$ 1,000.00	$ 1,000.00
Critical Deficiencies				
Install remote annunciation (Raco + 3 year service)	1	LS	$ 3,840.00	$ 3,840.00
Meter bypass fix - placeholder	1	LS	$ 10,000.00	$ 10,000.00
Install threadless sample taps	1	LS	$ 150.00	$ 150.00
Install surge relief valve	1	EA	$ 15,000.00	$ 15,000.00
Repair and adjust Bermad pump control valves	3	EA	$ 750.00	$ 2,250.00
Repair intake dampers	1	LS	$ 600.00	$ 600.00
Secondary Deficiencies				
Install an automated pump control system	1	LS	$ 30,000.00	$ 30,000.00
Replace inoperable pressure gages	1	LS	$ 1,500.00	$ 1,500.00
Repair ceiling insulation and install marine board	1	LS	$ 6,000.00	$ 6,000.00
Replace ceiling insulation damaged by water	1	LS	$ 1,000.00	$ 1,000.00
Install new packing on check valve shafts	3	EA	$ 200.00	$ 600.00
Paint pumps, valves and piping	1	LS	$ 5,000.00	$ 5,000.00
Paint meter vault piping	1	LS	$ 2,000.00	$ 2,000.00
Install pipe supports where required	1	LS	$ 2,500.00	$ 2,500.00
Subtotal				*$ 81,440.00*
Contractor Overhead and Profit	15	%		$ 12,216.00
Total Estimated Construction Cost				*$ 93,656.00*
Contingency	25	%		$ 23,414.00
Engineering	15	%		$ 17,560.50
Total Budget Estimate				**$ 134,630.50**

Middle Road Elevated Water Storage Tank
Prince George County Department of Public Utilities
Budgetary Cost Estimates
Attachment 2W

Date: December 16, 2014

Description	Quan	Unit	Unit Cost	Extension
Mobilization	1	LS	$ 1,000.00	$ 1,000.00
Critical Deficiencies				
Install threadless hose bibs for sample taps	1	LS	$ 150.00	$ 150.00
Provide yearly cathodic protection maintenance	1	LS	$ 1,500.00	$ 1,500.00
Secondary Deficiencies				
Install SCADA system[1]	1	LS	$ 10,000.00	$ 10,000.00
Repair altitude valve	1	LS	$ 1,500.00	$ 1,500.00
Install permanent structure for freeze protection	100	SF	$ 50.00	$ 5,000.00
Subtotal				*$ 19,150.00*
Contractor Overhead and Profit	15	%		$ 2,872.50
Total Estimated Construction Cost				*$ 22,022.50*
Contingency	25	%		$ 5,505.63
Engineering	15	%		$ 4,129.22
Total Budget Estimate				**$ 31,657.34**

1. Budget cost assumes that the SCADA system will be installed at the same time for the Middle Road BPS and the elevated tanks.

Courthouse Elevated Water Storage Tank
Prince George County Department of Public Utilities
Budgetary Cost Estimates
Attachment 3W

Date: December 16, 2014

Description	Quan	Unit	Unit Cost	Extension
Mobilization	1	LS	$ 1,000.00	$ 1,000.00
Critical Deficiencies				
Install grating over sump	1	LS	$ 800.00	$ 800.00
Repair drain/overflow pipe	1	LS	$ 6,000.00	$ 6,000.00
Seal opening around cell phone cables	1	LS	$ 2,000.00	$ 2,000.00
Install threadless sample taps	1	LS	$ 150.00	$ 150.00
Provide yearly cathodic protection maintenance	1	LS	$ 1,500.00	$ 1,500.00
Secondary Deficiencies				
Install SCADA system[1]	1	LS	$ 10,000.00	$ 10,000.00
Clean sump	1	LS	$ 400.00	$ 400.00
Paint piping in sump	1	LS	$ 1,800.00	$ 1,800.00
Paint tank base on inside	1	LS	$ 3,000.00	$ 3,000.00
Paint miscellaneous rusting pipe	1	LS	$ 2,500.00	$ 2,500.00
Install Concrete Floor	18	CY	$ 1,000.00	$ 18,000.00
Inspect, repair and adjust altitude valve	1	LS	$ 1,500.00	$ 1,500.00
Install permanent enclosure for freeze protection	100	SF	$ 50.00	$ 5,000.00
Subtotal				*$ 53,650.00*
Contractor Overhead and Profit	15	%		$ 8,047.50
Total Estimated Construction Cost				*$ 61,697.50*
Contingency	25	%		$ 15,424.38
Engineering	15	%		$ 11,568.28
Total Budget Estimate				**$ 88,690.16**

1. Budget cost assumes that the SCADA system will be installed at the same time for the Middle Road BPS and the elevated tanks.

Crosspointe Elevated Water Storage Tank
Prince George County Department of Public Utilities
Budgetary Cost Estimates
Attachment 4W

Date: December 16, 2014

Description	Quan	Unit	Unit Cost	Extension
Mobilization	1	LS	$ 1,000.00	$ 1,000.00
Critical Deficiencies				
Install threadless sample taps	1	LS	$ 150.00	$ 150.00
Provide yearly cathodic protection maintenance	1	LS	$ 1,500.00	$ 1,500.00
Secondary Deficiencies				
Install SCADA system[1]	1	LS	$ 10,000.00	$ 10,000.00
Clean sump	1	LS	$ 400.00	$ 400.00
Clean and paint piping in sump	1	LS	$ 1,800.00	$ 1,800.00
Install permanent enclosure for freeze protection	100	SF	$ 50.00	$ 5,000.00
Install sump pump in valve vault	1	LS	$ 2,500.00	$ 2,500.00
Clean and paint piping in valve vault	1	LS	$ 2,000.00	$ 2,000.00
Subtotal				*$ 24,350.00*
Contractor Overhead and Profit	15	%		$ 3,652.50
Total Estimated Construction Cost				*$ 28,002.50*
Contingency	25	%		$ 7,000.63
Engineering	15	%		$ 5,250.47
Total Budget Estimate				**$ 40,253.59**

1. Budget cost assumes that the SCADA system will be installed at the same time for the Middle Road BPS and the elevated tanks.

Richard Bland College Elevated Water Storage Tank
Prince George County Department of Public Utilities
Budgetary Cost Estimates
Attachment 5W

Date: December 16, 2014

Description	Quan	Unit	Unit Cost	Extension
Mobilization	1	LS	$ 1,000.00	$ 1,000.00
Critical Deficiencies				
Pump control panel not working correctly	1	LS	$ 1,500.00	$ 1,500.00
Provide yearly cathodic protection maintenance	1	LS	$ 1,500.00	$ 1,500.00
Install threadless sample taps	1	LS	$ 150.00	$ 150.00
Secondary Deficiencies				
Install SCADA system[1]	1	LS	$ 10,000.00	$ 10,000.00
Install 8" magnetic flow meter	1	LS	$ 15,680.00	$ 15,680.00
Install permanent enclosure for freeze protection	200	SF	$ 50.00	$ 10,000.00
Subtotal				*$ 39,830.00*
Contractor Overhead and Profit	15	%		$ 5,974.50
Total Estimated Construction Cost				*$ 45,804.50*
Contingency	25	%		$ 11,451.13
Engineering	15	%		$ 8,588.34
Total Budget Estimate				**$ 65,843.97**

1. Budget cost assumes that the SCADA system will be installed at the same time for the Middle Road BPS and the elevated tanks.

Route 301 Elevated Water Storage Tank
Prince George County Department of Public Utilities
Budgetary Cost Estimates
Attachment 6W

Date: December 16, 2014

Description	Quan	Unit	Unit Cost	Extension
Mobilization	1	LS	$ 1,000.00	$ 1,000.00
Critical Deficiencies				
Provide yearly cathodic protection maintenance	1	LS	$ 1,500.00	$ 1,500.00
Install threadless sample taps	1	LS	$ 150.00	$ 150.00
Secondary Deficiencies				
Install SCADA system[1]	1	LS	$ 10,000.00	$ 10,000.00
Clean sump	1	LS	$ 400.00	$ 400.00
Clean and paint piping in sump	1	LS	$ 1,800.00	$ 1,800.00
Inspect, repair and adjust altitude valve	1	LS	$ 1,500.00	$ 1,500.00
Install permanent enclosure for freeze protection	100	SF	$ 50.00	$ 5,000.00
Clean and paint piping in valve vault	1	LS	$ 2,000.00	$ 2,000.00
Subtotal				*$ 23,350.00*
Contractor Overhead and Profit	15	%		$ 3,502.50
Total Estimated Construction Cost				*$ 26,852.50*
Contingency	25	%		$ 6,713.13
Engineering	15	%		$ 5,034.84
Total Budget Estimate				**$ 38,600.47**

1. Budget cost assumes that the SCADA system will be installed at the same time for the Middle Road BPS and the elevated tanks.

Pumpkin/Days Inn Water System
Prince George County Department of Public Utilities
Budgetary Cost Estimates
Attachment 7W

Date: December 16, 2014

Description	Quan	Unit	Unit Cost	Extension
Mobilization	1	LS	$ 1,000.00	$ 1,000.00
Critical Deficiencies				
Install remote annunciation (Raco + 3 year service)	1	LS	$ 3,840.00	$ 3,840.00
Install grating over sump	1	LS	$ 800.00	$ 800.00
Install threadless sample taps	1	LS	$ 150.00	$ 150.00
Install chemical containment deck and ramp	1	LS	$ 600.00	$ 600.00
Secondary Deficiencies				
Install generator and ATS	1	LS	$ 44,660.00	$ 44,660.00
Install new doors and paint	1	EA	$ 2,000.00	$ 2,000.00
Repair insulation and jacket on outside piping	1	LS	$ 2,500.00	$ 2,500.00
Provide required controls for automatic operation	1	LS	$ 2,500.00	$ 2,500.00
Complete Block wall at hydro-tank	1	LS	$ 3,500.00	$ 3,500.00
Install Fence	200	LF	$ 40.00	$ 8,000.00
Install fluorescent lights in building	4	EA	$ 250.00	$ 1,000.00
Install chemical containment deck and ramp	1	EA	$ 600.00	$ 600.00
Check water softener issues and address	1	LS	$ 5,000.00	$ 5,000.00
Subtotal				*$ 76,150.00*
Contractor Overhead and Profit	15	%		$ 11,422.50
Total Estimated Construction Cost				*$ 87,572.50*
Contingency	25	%		$ 21,893.13
Engineering	15	%		$ 16,419.84
Total Budget Estimate				**$ 125,885.47**

Hampton Inn Water System
Prince George County Department of Public Utilities
Budgetary Cost Estimates
Attachment 8W

Date: December 16, 2014

Description	Quan	Unit	Unit Cost	Extension
Mobilization	1	LS	$ 1,000.00	$ 1,000.00
Critical Deficiencies				
Remove hydro-tank[1]	1	LS	$ 5,000.00	$ 5,000.00
Install SCADA system[1]	1	LS	$ 25,000.00	$ 25,000.00
Install threadless sample taps	1	LS	$ 150.00	$ 150.00
Install pipe supports on piping	1	LS	$ 500.00	$ 500.00
Install fence around well head	40	LF	$ 40.00	$ 1,600.00
Install chemical containment deck and ramp	1	LS	$ 600.00	$ 600.00
Secondary Deficiencies				
Install generator and ATS	1	LS	$ 44,660.00	$ 44,660.00
Paint doors and frame	1	EA	$ 600.00	$ 600.00
Install stainless steel hinges	6	EA	$ 75.00	$ 450.00
Repair insulation and jacket on outside piping	1	LS	$ 2,500.00	$ 2,500.00
Install new ss damper rain hood	2	ES	$ 800.00	$ 1,600.00
Check water softener issues and address	1	LS	$ 5,000.00	$ 5,000.00
Subtotal				*$ 88,660.00*
Contractor Overhead and Profit	15	%		$ 13,299.00
Total Estimated Construction Cost				*$ 101,959.00*
Contingency	25	%		$ 25,489.75
Engineering	15	%		$ 19,117.31
Total Budget Estimate				**$ 146,566.06**

Notes:

1. To remove hydro-tank a radio communication system must be installed between the elevated water tank in the system and the well house.

Beechwood Manor/Lemon Wood Water System
Prince George County Department of Public Utilities
Budgetary Cost Estimates
Attachment 9W

Date: December 16, 2014

Description	Quan	Unit	Unit Cost	Extension
Mobilization	1	LS	$ 1,000.00	$ 1,000.00
Critical Deficiencies				
Install remote annunciation (Raco + 3 year service)	1	LS	$ 3,840.00	$ 3,840.00
Installation cost of relocated hydro tank	1	LS	$ 12,000.00	$ 12,000.00
Install threadless sample taps	1	LS	$ 150.00	$ 150.00
Install chemical containment deck and ramp	1	EA	$ 600.00	$ 600.00
Secondary Deficiencies				
Building maintenance	1	LS	$ 11,000.00	$ 11,000.00
Concrete repair on atmospheric tank	1	LS	$ 6,000.00	$ 6,000.00
Repair pump seal on pump No. 2	1	LS	$ 1,800.00	$ 1,800.00
Install new gages on Pumps	4	EA	$ 250.00	$ 1,000.00
Replace and relocate electrical disconnect	1	LS	$ 2,500.00	$ 2,500.00
Replace all carbon steel pipe	1	LS	$ 4,000.00	$ 4,000.00
Replace rusty bolts and paint pipe, valves and fittings	1	LS	$ 6,500.00	$ 6,500.00
Remove hydraulic relief and replace with mechanical	1	LS	$ 2,500.00	$ 2,500.00
Install Exhaust fan and louvers	1	LS	$ 4,500.00	$ 4,500.00
Clear vegetation from fence	1	LS	$ 1,800.00	$ 1,800.00
New fence and Gate	300	LF	$ 40.00	$ 12,000.00
Clear and grade site	1	LS	$ 4,500.00	$ 4,500.00
Install covers on all electrical boxes	1	LS	$ 500.00	$ 500.00
Install ATS and add auto start to generator	1	LS	$ 6,000.00	$ 6,000.00
Subtotal				*$ 82,190.00*
Contractor Overhead and Profit	15	%		$ 12,328.50
Total Estimated Construction Cost				*$ 94,518.50*
Contingency	25	%		$ 23,629.63
Engineering	15	%		$ 17,722.22
Total Budget Estimate				**$ 135,870.34**

Cedar Wood Water System
Prince George County Department of Public Utilities
Budgetary Cost Estimates
Attachment 10W

Date: December 16, 2014

Description	Quan	Unit	Unit Cost	Extension
Mobilization	1	LS	$ 1,000.00	$ 1,000.00
Critical Deficiencies				
Install remote annunciation (Raco + 3 year service)	1	LS	$ 3,840.00	$ 3,840.00
Install threadless sample taps	1	LS	$ 150.00	$ 150.00
Secondary Deficiencies				
Install generator and ATS	1	LS	$ 44,660.00	$ 44,660.00
Provide required controls for automatic operation	1	LS	$ 2,500.00	$ 2,500.00
Install new gages on pumps	4	EA	$ 250.00	$ 1,000.00
Install Exhaust fan and louvers	1	LS	$ 4,500.00	$ 4,500.00
Repair insulation and jacket on outside piping	1	LS	$ 2,500.00	$ 2,500.00
Subtotal				*$ 60,150.00*
Contractor Overhead and Profit	15	%		$ 9,022.50
Total Estimated Construction Cost				*$ 69,172.50*
Contingency	25	%		$ 17,293.13
Engineering	15	%		$ 12,969.84
Total Budget Estimate				**$ 99,435.47**

Food Lion Water System
Prince George County Department of Public Utilities
Budgetary Cost Estimates
Attachment 11W

Date: December 16, 2014

Description	Quan	Unit	Unit Cost	Extension
Mobilization	1	LS	$ 1,000.00	$ 1,000.00
Critical Deficiencies				
Install remote annunciation (Raco + 3 year service)	1	LS	$ 3,840.00	$ 3,840.00
Install threadless sample taps	1	LS	$ 150.00	$ 150.00
Ladder Guard	1	LS	$ 800.00	$ 800.00
Install chemical containment deck and ramp	1	EA	$ 600.00	$ 600.00
Secondary Deficiencies				
Platform around generator	1	LS	$ 6,000.00	$ 6,000.00
Building Maintenance	1	LS	$ 8,000.00	$ 8,000.00
Provide required controls for automatic operation	1	LS	$ 2,500.00	$ 2,500.00
Replace pump seal	1	LS	$ 1,200.00	$ 1,200.00
Install new gages on pumps	4	EA	$ 250.00	$ 1,000.00
Install Exhaust fan and louvers	1	LS	$ 4,500.00	$ 4,500.00
Install pipe supports where required	1	LS	$ 2,500.00	$ 2,500.00
Electrical repairs	1	LS	$ 2,500.00	$ 2,500.00
Paint pumps, valves and piping	1	LS	$ 5,000.00	$ 5,000.00
Add stone for building access	1	LS	$ 2,000.00	$ 2,000.00
Repairs to blow off	1	LS	$ 800.00	$ 800.00
Install tank mixer	1	LS	$ 60,000.00	$ 60,000.00
Subtotal				*$ 102,390.00*
Contractor Overhead and Profit	15	%		$ 15,358.50
Total Estimated Construction Cost				*$ 117,748.50*
Contingency	25	%		$ 29,437.13
Engineering	15	%		$ 22,077.84
				$ 169,263.47

Jordan on the James Water System
Prince George County Department of Public Utilities
Budgetary Cost Estimates
Attachment 12W

Date: December 16, 2014

Description	Quan	Unit	Unit Cost	Extension
Mobilization	1	LS	$ 5,000.00	$ 5,000.00
Critical Deficiencies - Well Building				
Install remote annunciation (Raco + 3 year service)	1	LS	$ 3,840.00	$ 3,840.00
Install Exhaust fan and louvers	1	LS	$ 4,500.00	$ 4,500.00
Install dehumidifier	1	LS	$ 7,000.00	$ 7,000.00
Install threadless sample taps	1	LS	$ 150.00	$ 150.00
Replace all carbon steel pipe	1	LS	$ 4,000.00	$ 4,000.00
Replace Greensand Filters with new skid	1	LS	$ 90,000.00	$ 90,000.00
Install pipe supports where required	1	LS	$ 4,000.00	$ 4,000.00
Install new MCC	1	LS	$ 8,000.00	$ 8,000.00
Install chemical containment deck and ramp	1	EA	$ 600.00	$ 600.00
Install eyewash	1	LS	$ 600.00	$ 600.00
Secondary Deficiencies - Generator Building				
Reinstall louvers with dampers in generator room	1	LS	$ 3,000.00	$ 3,000.00
Clean and paint main service electrical Panels	1	LS	$ 800.00	$ 800.00
Install missing insulation and gypsum board	1	LS	$ 600.00	$ 600.00
Secondary Deficiencies - Well Building				
Install missing insulation and marine board on ceiling	1	LS	$ 8,000.00	$ 8,000.00
Provide required controls for automatic operation	1	LS	$ 2,500.00	$ 2,500.00
Install new gages on pumps	4	EA	$ 250.00	$ 1,000.00
Paint pumps, valves and piping	1	LS	$ 5,000.00	$ 5,000.00
Replace hot water heater	1	LS	$ 400.00	$ 400.00
Replace sink and counter	1	LS	$ 2,000.00	$ 2,000.00
Install new doors and paint	1	EA	$ 2,000.00	$ 2,000.00
Secondary Deficiencies Ground Storage Tank				
Replace rotten wood and paint trim	1	LS	$ 750.00	$ 750.00
Fill in void spaces around tank and compact	1	LS	$ 1,250.00	$ 1,250.00
Secondary Deficiencies - Site				
New fence and Gate	300	FT	$ 40.00	$ 12,000.00
Subtotal				*$ 166,990.00*
Contractor Overhead and Profit	15	%		$ 25,048.50
Total Estimated Construction Cost				*$ 192,038.50*
Contingency	25	%		$ 48,009.63
Engineering	15	%		$ 36,007.22
Total Budget Estimate				**$ 276,055.34**

Prince George Woods Water System
Prince George County Department of Public Utilities
Budgetary Cost Estimates
Attachment 13W

Date: December 16, 2014

Description	Quan	Unit	Unit Cost	Extension
Mobilization	1	LS	$ 1,000.00	$ 1,000.00
Critical Deficiencies				
Install remote annunciation (Raco + 3 year service)	1	LS	$ 3,840.00	$ 3,840.00
Install threadless sample taps	1	LS	$ 150.00	$ 150.00
Secondary Deficiencies				
Install generator and ATS	1	LS	$ 25,000.00	$ 25,000.00
Install new doors and paint	1	EA	$ 2,000.00	$ 2,000.00
Install Exhaust fan and louvers	1	LS	$ 4,500.00	$ 4,500.00
Provide required controls for automatic operation	1	LS	$ 2,500.00	$ 2,500.00
Paint hydro tank	1	LS	$ 12,000.00	$ 12,000.00
Install fluorescent lights in building	4	EA	$ 250.00	$ 1,000.00
New fence and Gate	120	FT	$ 40.00	$ 4,800.00
Subtotal				*$ 56,790.00*
Contractor Overhead and Profit	15	%		$ 8,518.50
Total Estimated Construction Cost				*$ 65,308.50*
Contingency	25	%		$ 16,327.13
Engineering	15	%		$ 12,245.34
Total Budget Estimate				**$ 93,880.97**

Bicors Drive - Rivers Edge Subdivision Water System
Prince George County Department of Public Utilities
Budgetary Cost Estimates
Attachment 14W

Date: December 16, 2014

Description	Quan	Unit	Unit Cost	Extension
Mobilization	1	LS	$ 1,000.00	$ 1,000.00
Critical Deficiencies				
Install remote annunciation (Raco + 3 year service)	1	LS	$ 3,840.00	$ 3,840.00
Install threadless sample taps	1	LS	$ 150.00	$ 150.00
Labor to install new tank	1	LS	$ 12,000.00	$ 12,000.00
New hydro tank cost	1	LS	$ 36,000.00	$ 36,000.00
Secondary Deficiencies				
Install generator and ATS for 2-15 hp pumps	1	LS	$ 25,000.00	$ 25,000.00
Install Exhaust fan and louvers	1	LS	$ 4,500.00	$ 4,500.00
Sandblast and paint atmospheric tank	1	LS	$ 12,000.00	$ 12,000.00
Repair insulation and jacket on outside piping	1	LS	$ 2,500.00	$ 2,500.00
Repair building floor drain piping	1	LS	$ 500.00	$ 500.00
Install fluorescent lights in building	4	EA	$ 250.00	$ 1,000.00
Subtotal				*$ 98,490.00*
Contractor Overhead and Profit	15	%		$ 14,773.50
Total Estimated Construction Cost				*$ 113,263.50*
Contingency	25	%		$ 28,315.88
Engineering	15	%		$ 21,236.91
Total Budget Estimate				**$ 162,816.28**

Liverman Well at Rivers Edge Water System
Prince George County Department of Public Utilities
Budgetary Cost Estimates
Attachment 15W

Date: December 16, 2014

Description	Quan	Unit	Unit Cost	Extension
Mobilization	1	LS	$ 1,000.00	$ 1,000.00
Critical Deficiencies				
Install remote annunciation (Raco + 3 year service)	1	LS	$ 3,840.00	$ 3,840.00
Secondary Deficiencies				
Install generator and ATS	1	LS	$ 25,000.00	$ 25,000.00
Install Exhaust fan and louvers	1	LS	$ 4,500.00	$ 4,500.00
Install fluorescent lights in building	4	EA	$ 250.00	$ 1,000.00
Install missing wall board	1	LS	$ 800.00	$ 800.00
Preform minor electricial repairs	1	LS	$ 1,200.00	$ 1,200.00
Subtotal				*$ 37,340.00*
Contractor Overhead and Profit	15	%		$ 5,601.00
Total Estimated Construction Cost				*$ 42,941.00*
Contingency	25	%		$ 10,735.25
Engineering	15	%		$ 8,051.44
Total Budget Estimate				**$ 61,727.69**

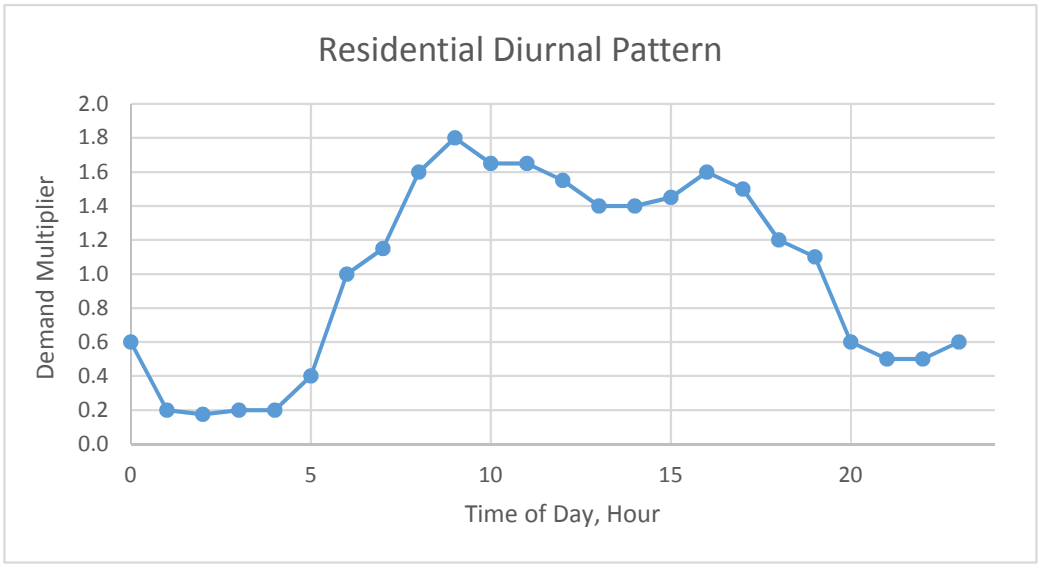
Appendix C:
Reference Information

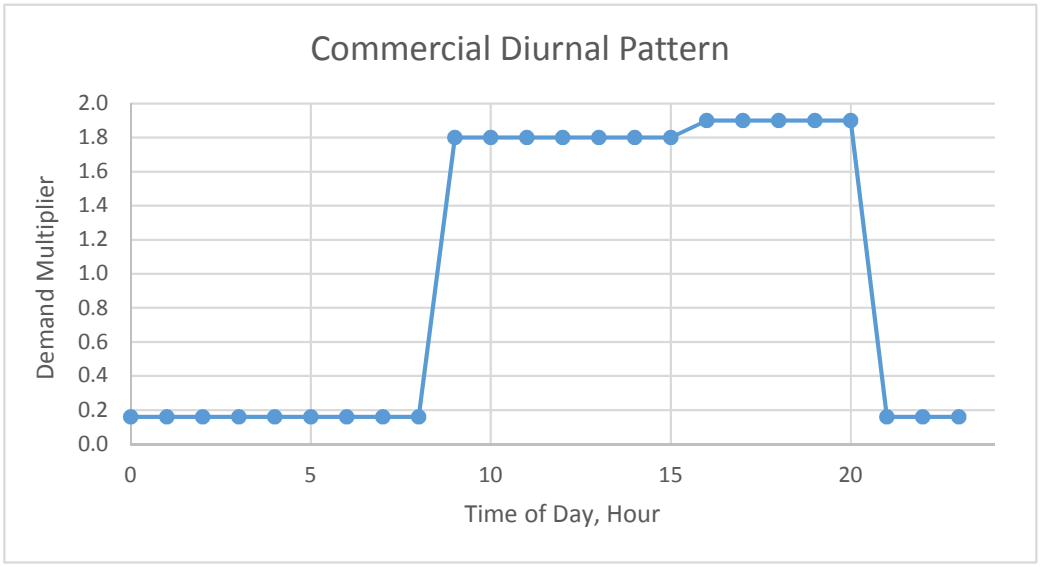
www.dewberry.com

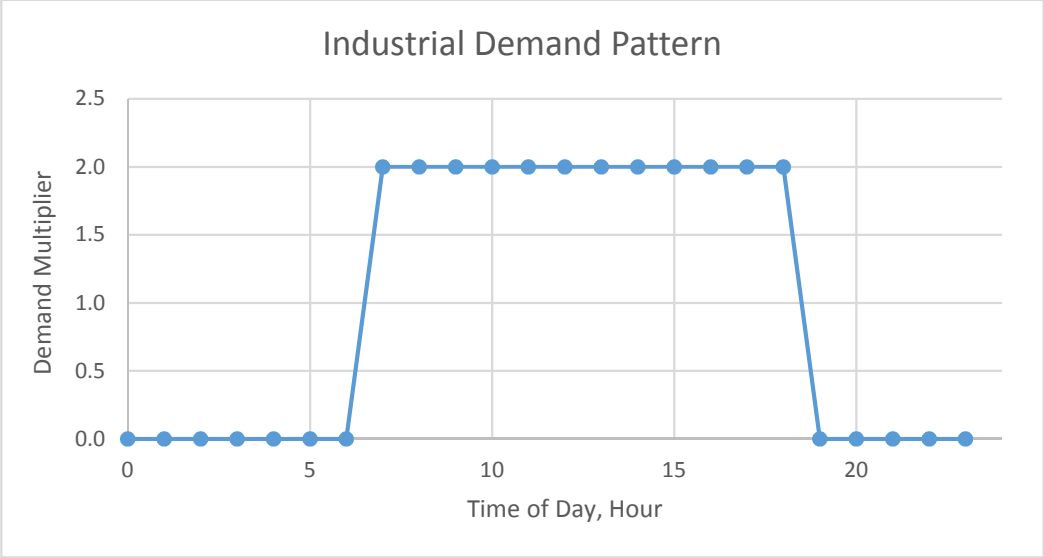
Water and Wastewater Master Plan
Prince George County, Virginia

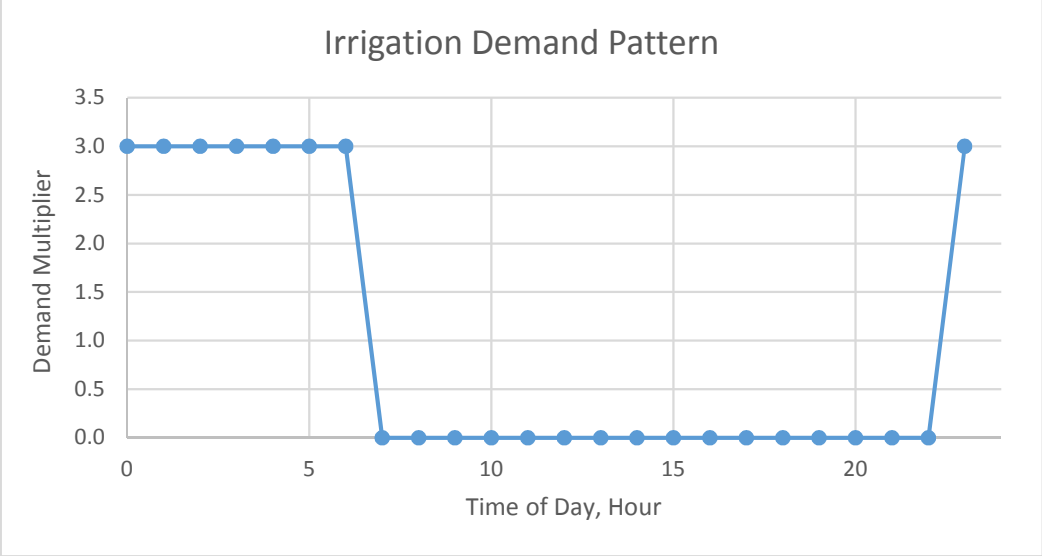
From E-ONE product catalog:

Table 3 MAXIMUM NUMBER OF GRINDER PUMP CORES OPERATING DAILY	
Number of Grinder Pump Cores Connected	**Maximum Daily Number of Grinder Pump Cores Operating Simultaneously**
1	1
2-3	2
4-9	3
10-18	4
19-30	5
31-50	6
51-80	7
81-113	8
114-146	9
147-179	10
180-212	11
213-245	12
246-278	13
279-311	14
312-344	15
345-377	16
378-410	17
411-443	18
444-476	19
477-509	20
510-542	21
543-575	22
576-608	23
609-641	24
642-674	25
675-707	26
708-740	27
741-773	28
774-806	29
807-839	30
840-872	31
873-905	32
906-938	33
939-971	34
972-1004	35


Residential Diurnal Pattern
Demand Multiplier
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0
5
10
15
20
Time of Day, Hour


Commercial Diurnal Pattern
Demand Multiplier
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0
5
10
15
20
Time of Day, Hour


Industrial Demand Pattern
Demand Multiplier
2.5
2.0
1.5
1.0
0.5
0.0
0
5
10
15
20
Time of Day, Hour


Irrigation Demand Pattern
Demand Multiplier
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0
5
10
15
20
Time of Day, Hour

Appendix D:
Alternative ARWA Water Supply Option

www.dewberry.com

Water and Wastewater Master Plan
Prince George County, Virginia

ARWA Water Supply (Alternative Option)

This option consists of maximizing ARWA as a water supply source for the Central system with water supply supplement from the VAWC system in Hopewell.

Under this scenario, it is assumed that Prince George County would be able to negotiate an additional 1.0 MGD from another ARWA member for a total plant allocation of 3.69 MGD. In order to be able to deliver this plant allocation to the Temple Avenue connection, Prince George County would be required to share in the cost of extensive ARWA transmission and water supply upgrades; with the exact cost being unknown at this time. Additionally, in order to deliver the plant allocation from the Temple Avenue connection to the Central system, both existing transmission main and booster pump station capacity along Temple Avenue will need to be upgraded.

As shown in **Figure D-1**, this option would include the construction of a 6.0 MGD booster pump station with a 2.0 MG ground storage tank near the intersection of Temple Avenue and River Road and a 24-inch transmission main from the ARWA connection point at Temple Avenue to the Southpoint elevated storage tank. The existing Central System booster pump station would be decommissioned. A new 24-inch water transmission main extending to the Southpoint tank would be required as the majority of the additional demand is expected within the Southpoint Business Park. For this scenario, it is assumed that the Food Lion water facility and 1.0 MG tank would be connected into the Central system as recommended in Chapter 6 to provide an additional buffer during maximum day demands. These upgrades would be adequate to supply water to the Central system required in the 2020 planning period.

To accommodate the additional demand that is projected within the 2025 planning period, an additional 1.5 MGD booster pump station located at the border of Hopewell along Route 156 would need to be constructed to provide supplemental flow to the system. A 12-inch water main extension would be required along Route 156 between the existing 12-inch main that ends at Mount Sinai Road to the intersection of Courthouse Road to allow for adequate water transmission capacity without over pressurizing existing neighborhoods. Additionally, a 20-inch water main would be required along Courthouse Road connecting the new 12-inch water main and the 24-inch transmission main (constructed in 2020) at the intersection of Commons Drive.

Based upon discussions with VAWC, the maximum available supply capacity at this connection is approximately 1.5 MGD, without requiring upgrades to the existing Virginia American distribution system. The Hopewell water treatment plant may require some upgrades to provide the additional supply; however, these are expected to be minimal.

A third connection point to the City of Hopewell along Route 10 would be required to supply water from VAWC through the 2035-2045 planning period. This project would need to consist of a 2.0 MGD booster pump station with a 0.5 MG ground storage tank and 20-inch transmission main routed from the new booster pump station, west along Route 10, south along Ruffin Road and connecting into the 20-inch water main, constructed in 2025.

The estimated cost of this water supply option, described above, is approximately $41,840,000 through the end of the planning period in 2045.

It is understood that ARWA will be required to undergo capacity upgrades in both their water treatment plant and transmission mains. In order to fund these capacity upgrades, all members of ARWA will be charged higher rates for their water supply and will be required to share in the costs of the improvements. In addition, the total estimated cost of the water supply improvements for alternative ARWA option are higher than the estimated cost for the recommended VAWC option through the end of the planning period.

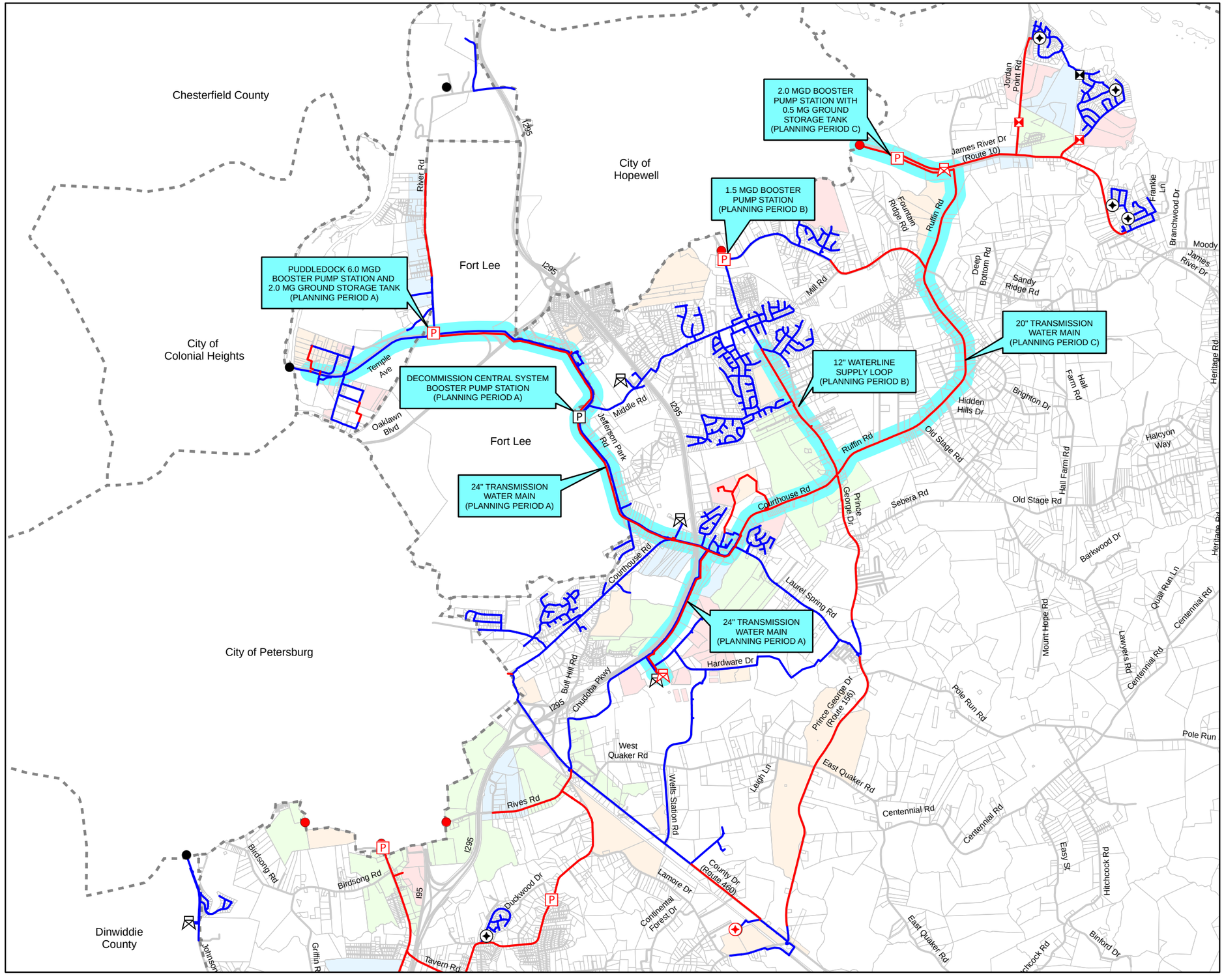


FIGURE NO. D-1

TITLE CENTRAL SERVICE AREA
ARWA WATER SUPPLY OPTION

SCALE 1 inch = 6,000 feet

PROJECT WATER & WASTEWATER MASTER PLAN
PRINCE GEORGE COUNTY, VA

DATE 01/2016

PROJ. NO. 50068442

Dewberry
Dewberry Engineers Inc.
4805 LAKE BROOK DRIVE, SUITE 200
GLEN ALLEN, VIRGINIA 23060
PHONE: 804.290.7957
FAX: 804.290.7928

Appendix E:
Alternative Route 460 and Manchester Run Wastewater Collection and Conveyance Option

www.dewberry.com

Route 460 and Route 10 Wastewater Collection and Conveyance Alternative Option

The alternative option evaluated for wastewater collection and conveyance consisted of routing wastewater flows within the existing flow paths. As shown in **Figure E-1**, this would require significant upgrades to the existing sewer infrastructure to accommodate future projected loadings. Many new pump stations would need to be constructed in order to convey projected sewer loadings from developments such as the Southpoint Business Park, and commercial developments along Rives Road and Route 156 to areas of existing infrastructure. In addition to constructing new pump stations, a majority of the existing pump stations would need to be upgraded to accommodate additional flow and meet the changing head conditions of their discharge force mains. Many existing gravity interceptors would also need to be upsized including the interceptors along Courthouse Road, Route 460, and portions of the Manchester Run interceptor.

The following improvements are anticipated to be required to serve projected wastewater flows within the Route 460 and Route 10 wastewater systems:

- Construction of 0.5 MGD pump station and approximately 6,000 linear feet of 6-inch force main to serve development along Route 156 south of Quaker Road.
- Construction of 0.5 MGD pump station, approximately 3,100 linear feet of 6-inch force main, and approximately 2,500 linear feet of 12-inch gravity sewer to serve development along Route 156 north of Quaker Road.
- Increase capacity of SPS-015 to 1.0 MGD and upgrade approximately 4,500 linear feet of 6-inch force main to 8-inch.
- Increase capacity of SPS-010 to 1.0 MGD and upgrade approximately 1,800 linear feet of 8-inch gravity main to 12-inch.
- Increase capacity of SPS-009 to 1.3 MGD and upgrade approximately 6,500 linear feet of 8-inch force main to 10-inch.
- Construction of 1.0 MGD pump station and approximately 5,900 linear feet of 10-inch and 12-inch force main to serve development north of Rives Road.
- Construction of 0.3 MGD pump station and approximately 3,300 linear feet of 6-inch force main to serve development south of Rives Road.

- Construction of 2.3 MGD pump station and approximately 3,100 linear feet of 14-inch force main to serve industrial development along Quality Way within Southpoint Business Park.
- Construction of 1.2 MGD pump station and approximately 4,200 linear feet of 10-inch force main to serve industrial development along Hardware Drive within Southpoint Business Park.
- Increase SPS-021 capacity to 3.75 MGD and construct approximately 16,500 linear feet of 16-inch force main.
- Upgrade existing 12-inch gravity main along Route 460 to 27-inch – approximately 7,300 linear feet.
- Upgrade existing 18-inch gravity main along Courthouse Road to 24-inch – approximately 8,000 linear feet.
- Increase capacity of SPS-003 to 2.4 MGD and upgrade approximately 20,400 linear feet of 10-inch and 12-inch force main to 16-inch.
- Construction of a duplex grinder pump station and 1,600 linear feet of 3-inch force main to serve Scott Park.
- Construction of 2.0 MGD pump station and approximately 12,100 linear feet of 12-inch force main to serve development near the intersection of Ruffin Road and Route 156.
- Construction of a 1.5 MGD pump station, 13,600 linear feet of 12-inch force main, 3,800 linear feet of 12-inch gravity sewer, and 8,300 linear feet of 15-inch gravity sewer to provide additional sewer service the Route 10 service area.
- Construction of a 0.5 MGD pump station, 2,700 linear feet of 8-inch force main, and 4,000 linear feet of 16-inch force main to serve development along Ruffin Road.
- Upgrade existing 12-inch and 15-inch Manchester Run gravity main to 18-inch – approximately 2,600 linear feet.
- Construction of 6,000 linear feet of 8-inch gravity sewer to serve existing residential development in Beechwood Manor.
- Construction of a 0.5 MGD pump station, 1,800 linear feet of 4-inch force main, and 4,100 linear feet of 8-inch gravity main to serve existing residential development in River's Edge.

By maintaining the current flow paths, the majority of wastewater within the Route 460 wastewater system would be discharged to the City of Petersburg. As discussed in Chapter 10, it is anticipated that extensive and costly upgrades would be required to the City of Petersburg's wastewater collection system and it is unknown whether additional treatment capacity could be obtained at the SCWWA Treatment Plant.

The projected improvements for this alternative option are estimated to cost a total of $54,310,000 through the 30 year planning period. This estimate does not include upgrade costs for the Petersburg sewer conveyance system or the SCWWA Treatment Plant. This option would include the addition of twelve (12) new pump stations within the Route 460 system, in addition to the existing twenty-five (25), for a total of thirty-seven (37) pump stations.

Chesterfield County

City of Hopewell

Fort Lee

City of Colonial Heights

City of Petersburg

Dinwiddie County

Regional Jail Outfall (Hopewell)

Manchester Run Outfall

Baileys Ridge Outfalls

Route 36 Outfall

Future Puddledock Outfall

Puddledock Outfall

Route 460 Outfall

Johnson Road Outfall

Route 301 Outfall

SPS-005

SPS-007

SPS-009

SPS-010

SPS-011

SPS-012

SPS-013

SPS-014

SPS-015

SPS-016

SPS-017

SPS-018

SPS-019

SPS-020

SPS-021

SPS-022

SPS-023

SPS-024

1.5 MGD PUMP STATION (PLANNING PERIOD C)

13,600 LF 12" FORCE MAIN (PLANNING PERIOD C)

0.5 MGD PUMP STATION (PLANNING PERIOD B)

4,000 LF 16" FORCE MAIN (PLANNING PERIOD B)

UPGRADE 2,600 LF 18" GRAVITY MAIN (PLANNING PERIOD C)

DUPLEX GRINDER PUMP STATION AND 1,600 LF OF 3" FORCE MAIN (PLANNING PERIOD A)

2.0 MGD PUMP STATION (PLANNING PERIOD D)

12,100 LF 12" FORCE MAIN (PLANNING PERIOD D)

UPGRADE 8,000 LF 24" GRAVITY MAIN (PLANNING PERIOD D)

2.3 MGD PUMP STATION (PLANNING PERIOD A)

UPGRADE 20,400 LF 14" FORCE MAIN (PLANNING PERIOD D)

1.2 MGD PUMP STATION (PLANNING PERIOD A)

2.4 MGD PUMP STATION UPGRADE (PLANNING PERIOD D)

UNKNOWN UPGRADE REQUIREMENTS FOR PETERSBURG CONVEYANCE SYSTEM

UPGRADE 7,300 LF 27" GRAVITY MAIN (PLANNING PERIOD A)

3.75 MGD PUMP STATION UPGRADE (PLANNING PERIOD A)

0.5 MGD PUMP STATION (PLANNING PERIOD B)

1.0 MGD PUMP STATION (PLANNING PERIOD C)

UPGRADE 16,500 LF 16" FORCE MAIN (PLANNING PERIOD A)

1.30 MGD PUMP STATION UPGRADE (PLANNING PERIOD B)

0.5 MGD PUMP STATION (PLANNING PERIOD B)

0.3 MGD PUMP STATION (PLANNING PERIOD D)

1.0 MGD PUMP STATION UPGRADE (PLANNING PERIOD B)

1.0 MGD PUMP STATION UPGRADE (PLANNING PERIOD B)

BEECHWOOD MAN SERVICE EXTENS (EXISTING IMPROVEM

RIVER'S EDGE SERVICE EXTENSION (EXISTING IMPROVEMENTS)

I295

River Rd

Temple Ave

Oakdawn Blvd

Middle Rd

Courthouse Rd

Jordan Point Rd

James River Dr (Route 10)

Fountain Ridge Rd

Ruffin Rd

Mill Rd

Ridge Rd

Branchwood Dr

Moody Rd

Heritage Rd

Brighton Dr

Hall Farm Rd

Halcyon Way

Prince George Dr (Route 156)

Old Stage Rd

Sebera Rd

Barkwood Dr

Quail Run Ln

Centennial Rd

Mount Hope Rd

Lawyers Rd

Pole Run Rd

East Quaker Rd

Leigh Ln

Station Rd

Rives Rd

Lamore Dr

County Dr (Route 460)

Easy St

Hitchcock Rd

Binford Dr

Hardware Dr

Chudoba Pkwy

Bull Hill Rd

Laurel St

Birdsong Rd

Griffin Rd

Tavern Rd

Johnson Rd

N

W

E

S

Legend

- Jurisdictional Boundaries
- Road Centerlines
- Tax Parcels
- Gravity Line
- Force Mains

Pump Stations

- Existing
- Future
- Improvement
- Private

Discharge Location

- Existing
- Future

Future Development

- 2020
- 2025
- 2035
- 2045

Key Plan

FIGURE NO. E-1

TITLE FUTURE WASTEWATER IMPROVEMENTS ALTERNATIVE OPTION

SCALE 1 inch = 6,000 feet

PROJECT WATER & WASTEWATER MASTER PLAN PRINCE GEORGE COUNTY, VA

DATE 01/2016

PROJ. NO. 50068442

Dewberry
Dewberry Engineers Inc.
4805 LAKE BROOK DRIVE, SUITE 200
GLEN ALLEN, VIRGINIA 23060
PHONE: 804.290.7957
FAX: 804.290.7928