



# Alternative 7 Flood Depth - 25 Year Storm



Project Location

Laurel Creek Pump Station

Alternative 7: Laurel, North, Samuel Butts, and Buschman Pumps; Navy Diversion & Bottleneck Removal with Parallel Pump Systems at LPGA, & Reed Canals

North Street Pump Station

LPGA Canal Pump Station

Samuel Butts Pump Station

Reed Canal Pump Station

Navy Canal Diversion

Buschman Pump Station

### Legend

Study Area

### 25yr Alt 7 Flood Depth

- 5+
- 3 - 5
- 2 - 3
- 1 - 2
- 0.5 - 1
- 0 - 0.5

0 5,000 10,000 20,000 Feet

Wednesday, April 21, 2010 3:56:27 PM Z:\187458\_EVRWA\73553\_(NovaCanal)\GIS\Figures\Flood\25-yr\NovaFloodingPh3A17-25yr.mxd



East Volusia Regional Water Authority (EVRWA)

Figure 25yr Alt 7  
Nova Canal Flood Control and  
Integrated Water Resources Program  
Nova Canal Alternative 7 Flooding 25 Year Storm



# **Appendix H**

## **Cost Estimates**

# EVRWA-Nova Canal Flood Control LPGA Pump Station (Pump Only) at Centennial Park

## PRELIMINARY OPINION OF PROBABLE COST

ITEM NO.	DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL
1	Mobilization	1	LS	\$ 20,000	\$ 20,000
2	Clearing and Grubbing	1	AC	\$ 10,000	\$ 10,000
3	Excavation, Grading and Dewatering	225,000	CY	\$ 4	\$ 900,000
4	<b>600 cfs Pump Station</b>				
	200 cfs Pump	3	EA	\$ 968,000	\$ 2,904,000
	Concrete Structure	1	LS	\$ 600,000	\$ 600,000
	Electrical	1	LS	\$ 350,000	\$ 350,000
5	Standby Generator - 2000 kw	1	LS	\$ 600,000	\$ 600,000
6	Tide Control Gate including concrete structure	1	LS	\$ 750,000	\$ 750,000
7	Replace Railroad Trestle	1	LS	\$ 500,000	\$ 500,000
8	Drainage Connection 10th Street to Cent Pk Lake	1	LS	\$ 100,000	\$ 100,000
9	Access Road	1	LS	\$ 10,000	\$ 10,000
10	Power Upgrade to Site	1	LS	\$ 200,000	\$ 200,000
11	Gravity Wall	400	LF	\$ 500	\$ 200,000
12	Miscellaneous Restoration	1	LS	\$ 200,000	\$ 200,000
13	School Property Acquisition	15	AC	tbd	tbd
	<b>Subtotal</b>				<b>\$ 7,344,000</b>
	<b>Contingency (30%)</b>				<b>\$ 2,203,000</b>
	<b>Engineering, Surveying and Permitting(15%)</b>				<b>\$ 1,102,000</b>
	<b>Total Estimated Project Component Cost</b>				<b>\$ 10,649,000</b>

**Notes:**

- 1) Estimated tide gate cost
- 2) Costs are in 2009 dollars
- 3) Costs do not include wetland mitigation, maintenance, or monitoring
- 4) Costs do not include replacement, relocation, or rehabilitation of non-stormwater infrastructure unless noted otherwise.
- 5) Costs do not include potential hazardous remediation.
- 6) School property identified is a portion of Holly Hill Middle School - cost to be determined(tbd).
- 7) Excavation includes pond at school board property

## EVRWA-Nova Canal Flood Control Reed Canal Pump Station - 1125 cfs (Pump Only)

### PRELIMINARY OPINION OF PROBABLE COST

ITEM NO.	DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL
1	Mobilization	1	LS	\$ 20,000	\$ 20,000
2	Clearing and Grubbing	2	AC	\$ 10,000	\$ 20,000
3	Excavation and Grading	75,000	CY	\$ 4	\$ 300,000
4	<b>1125 cfs Pump Station</b>				
	225 cfs Pump	5	EA	\$ 980,000	\$ 4,900,000
	Concrete Structure	1	LS	\$ 750,000	\$ 750,000
	Electrical	1	LS	\$ 400,000	\$ 400,000
5	Stand By Generator (4000 kw)	1	LS	\$ 750,000	\$ 750,000
6	Tide Control Gate including concrete structure	1	LS	\$ 750,000	\$ 750,000
7	Canal Bank Hardening	2400	LF	\$ 180	\$ 432,000
8	Access Road	1	LS	\$ 20,000	\$ 20,000
9	Erosion Control at Outfall	1	LS	\$ 50,000	\$ 50,000
10	Power Upgrade to Site	1	LS	\$ 250,000	\$ 250,000
11	Utility Relocation	1	LS	\$ 100,000	\$ 100,000
12	Miscellaneous Restoration	1	LS	\$ 200,000	\$ 200,000
	<b>Subtotal</b>				<b>\$ 8,942,000</b>
	<b>Contingency (30%)</b>				<b>\$ 2,683,000</b>
	<b>Engineering, Surveying and Permitting(15%)</b>				<b>\$ 1,341,000</b>
	<b>Total Estimated Project Component Cost</b>				<b>\$ 12,966,000</b>

**Notes:**

- 1) Costs are in 2009 dollars
- 2) Costs do not include wetland mitigation, maintenance, or monitoring
- 3) Costs do not include replacement, relocation, or rehabilitation of non-stormwater infrastructure unless noted otherwise.
- 4) Costs do not include potential hazardous remediation.
- 5) Property acquisition is not needed, South Daytona owns pump station site.

# EVRWA-Nova Canal Flood Control Halifax Canal Pond and Pump Station - Summitt Golf Site

## PRELIMINARY OPINION OF PROBABLE COST

ITEM NO.	DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL
1	Mobilization	1	LS	\$ 20,000	\$ 20,000
2	Clearing and Grubbing	9	AC	\$ 8,000	\$ 72,000
3	Excavation and Grading	150,000	CY	\$ 4	\$ 600,000
4	<b>300 cfs Pump Station</b>				
	100 cfs Pump	3	EA	\$ 175,000	\$ 525,000
	Concrete Structure	1	LS	\$ 350,000	\$ 350,000
	Electrical incl building	1	LS	\$ 250,000	\$ 250,000
5	Stand By Generator (750 kw)	1	LS	\$ 350,000	\$ 350,000
6	Tide Control Gate including concrete structure	1	LS	\$ 750,000	\$ 750,000
7	Access Road	1	LS	\$ 20,000	\$ 20,000
8	Erosion Control at Outfall	1	LS	\$ 50,000	\$ 50,000
9	Power Upgrade to Site	1	LS	\$ 200,000	\$ 200,000
10	Dbl 8'x 5' Box Culvert at Ryanwood	75	LF	\$ 2,500	\$ 187,500
11	Dbl 8'x 5' Box Culvert at Jackson Street	75	LF	\$ 2,500	\$ 187,500
12	Channel Widening (20-ft additional)	500	LF	\$ 130	\$ 65,000
13	Utility Relocation	1	LS	\$ 100,000	\$ 100,000
14	Miscellaneous Restoration	1	LS	\$ 200,000	\$ 200,000
15	Property Acquisition	12	AC	tbd	tbd
	<b>Subtotal</b>				<b>\$ 3,927,000</b>
	<b>Contingency (30%)</b>				<b>\$ 1,178,000</b>
	<b>Engineering, Surveying and Permitting(15%)</b>				<b>\$ 589,000</b>
	<b>Total Estimated Project Component Cost</b>				<b>\$ 5,694,000</b>

**Notes:**

- 1) Costs are in 2009 dollars
- 2) Costs do not include wetland mitigation, maintenance, or monitoring
- 3) Costs do not include replacement, relocation, or rehabilitation of non-stormwater infrastructure unless noted otherwise.
- 4) Costs do not include potential hazardous remediation.
- 5) Property Acquisition of Summitt Golf site is to be determined

# EVRWA-Nova Canal Flood Control Navy Canal Diversion

## PRELIMINARY OPINION OF PROBABLE COST

ITEM NO.	DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL
1	Mobilization	1	LS	\$ 20,000	\$ 20,000
2	Clearing and Grubbing	72	AC	\$ 8,000	\$ 576,000
3	Excavation, Grading and Dewatering	903,467	CY	\$ 4	\$ 3,613,868
4	Diversion Structure at Clyde Morris	1	EA	\$ 50,000	\$ 50,000
5	Pipe Under Road at East of Airport(8' CMP)	600	LF	\$ 250	\$ 150,000
6	112" x 72" HERPC	81	LF	\$ 220	\$ 17,820
7	Regrade Existing Ditch to 50' btm and 4:1 S.S.	1,150	LF	\$ 80	\$ 92,000
8	Create New Ditch 50-ft btm with 4:1 S.S.	5,500	LF	\$ 190	\$ 1,045,000
9	50-ft Wide Weir Structure	1	LS	\$ 40,000	\$ 40,000
10	100-ft Wide Weir Structure with Overflow	2	LS	\$ 65,000	\$ 130,000
11	Control Structure at Beville Road	1	LS	\$ 65,000	\$ 65,000
12	(2) 5'x8' Reinf. Concrete Box Culvert	100	LF	\$ 2,500	\$ 250,000
13	(2) 48" RCP	100	LF	\$ 160	\$ 16,000
14	(2) 42" RCP	350	LF	\$ 140	\$ 49,000
15	(2) 60" RCP	50	LF	\$ 180	\$ 9,000
16	Utility Adjustments	1	LS	\$ 500,000	\$ 500,000
17	Road Restoration	1	LS	\$ 150,000	\$ 150,000
18	Miscellaneous Restoration	1	LS	\$ 200,000	\$ 200,000
19	Property Acquisitions	234	ac	tbd	tbd
	<b>Subtotal</b>				<b>\$ 6,974,000</b>
	<b>Contingency (30%)</b>				<b>\$ 2,092,000</b>
	<b>Engineering, Surveying and Permitting(15%)</b>				<b>\$ 1,046,000</b>
	<b>Total Estimated Project Component Cost</b>				<b>\$ 10,112,000</b>

**Notes:**

- 1) Costs are in 2009 dollars
- 2) Costs do not include wetland mitigation, maintenance, or monitoring
- 3) Costs do not include replacement, relocation, or rehabilitation of non-stormwater infrastructure unless noted otherwise.
- 4) Costs do not include potential hazardous remediation.
- 5) Property Acquisition to be determined
- 6) Excavation estimated at 70 ac times avg 8 ft depth. X \$4 per cy

# EVRWA-Nova Canal Flood Control Laurel Creek Pond, Pump Station and Force Main

## PRELIMINARY OPINION OF PROBABLE COST

ITEM NO.	DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL
1	<b>Mobilization</b>	1	LS	\$ 20,000	\$ 20,000
2	<b>Clearing and Grubbing</b>	12	AC	\$ 8,000	\$ 96,000
3	<b>Excavation, Grading and Dewatering</b>	260,000	CY	\$ 4	\$ 1,040,000
4	<b>150 cfs Pump Station</b>				
	75 cfs Pump	2	EA	\$ 350,000	\$ 700,000
	Concrete Structure	1	LS	\$ 250,000	\$ 250,000
	Electrical incl building	1	LS	\$ 175,000	\$ 175,000
5	<b>Stand By Generator - 500 kw</b>	1	LS	\$ 250,000	\$ 250,000
6	<b>72-inch Force Main</b>	8000	LF	\$ 750	\$ 6,000,000
7	<b>Jack &amp; Bore 72" dia FM in 8' dia Casing</b>	300	LF	\$ 2,500	\$ 750,000
8	<b>Pipe End Treatment/Structure</b>	1	LS	\$ 50,000	\$ 50,000
9	<b>Utility Adjustments</b>	1	LS	\$ 500,000	\$ 500,000
10	<b>Power Upgrade to Site</b>	1	LS	\$ 150,000	\$ 150,000
11	<b>Road Restoration</b>	1	LS	\$ 150,000	\$ 150,000
12	<b>Miscellaneous Restoration</b>	1	LS	\$ 200,000	\$ 200,000
13	<b>Property Acquisitions</b>				
	Division Ave Pond	12	AC	tbd	tbd
	Rio Way Property Acquisitions	22	homes	tbd	tbd
	<b>Subtotal</b>				\$ 10,331,000
	<b>Contingency (30%)</b>				\$ 3,099,000
	<b>Engineering, Surveying and Permitting(15%)</b>				\$ 1,550,000
	<b>Total Estimated Project Component Cost</b>				<b>\$ 14,980,000</b>

**Notes:**

- 1) Costs are in 2009 dollars
- 2) Costs do not include wetland mitigation, maintenance, or monitoring
- 3) Costs do not include replacement, relocation, or rehabilitation of non-stormwater infrastructure unless noted otherwise.
- 4) Costs do not include potential hazardous remediation.
- 5) Property Acquisition cost is to be determined
- 6) Excavation includes Division Ave(12 ac) and Rio Way(8ac) avg 8 ft depth.
- 7) Rio Way cost to purchase home obtained from Volusia County

# EVRWA-Nova Canal Flood Control North Street Pump Station and Force Main

## PRELIMINARY OPINION OF PROBABLE COST

ITEM NO.	DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL
1	Mobilization	1	LS	\$ 20,000	\$ 20,000
2	Clearing and Grubbing	2	AC	\$ 10,000	\$ 20,000
3	Excavation, Grading and Dewatering	25,000	CY	\$ 4	\$ 100,000
4	<b>500 cfs Pump Station</b>				
	168 cfs Pump	3	EA	\$ 955,000	\$ 2,865,000
	Concrete Structure	1	LS	\$ 550,000	\$ 550,000
	Electrical incl building	1	LS	\$ 350,000	\$ 350,000
5	Stand By Generator - 1500 kw	1	LS	\$ 500,000	\$ 500,000
6	10' dia. Force Main	6700	LF	\$ 1,200	\$ 8,040,000
7	Jack & Bore 10' dia FM in 14' dia Casing	300	LF	\$ 3,500	\$ 1,050,000
8	Pipe End Treatment/Structure	1	LS	\$ 50,000	\$ 50,000
9	Utility Adjustments	1	LS	\$ 500,000	\$ 500,000
10	Triple 5' x 8' Box Culvert - Nova Canal to Pond	2100	LF	\$ 3,500	\$ 7,350,000
11	Power Upgrade to Site	1	LS	\$ 200,000	\$ 200,000
12	Road Restoration	1	LS	\$ 240,000	\$ 240,000
13	Miscellaneous Restoration	1	LS	\$ 200,000	\$ 200,000
	<b>Subtotal</b>				\$ 22,035,000
	<b>Contingency (30%)</b>				\$ 6,611,000
	<b>Engineering, Surveying and Permitting(15%)</b>				\$ 3,305,000
	<b>Total Estimated Project Component Cost</b>				<b>\$ 31,951,000</b>

**Notes:**

- 1) Costs are in 2009 dollars
- 2) Costs do not include wetland mitigation, maintenance, or monitoring
- 3) Costs do not include replacement, relocation, or rehabilitation of non-stormwater infrastructure unless noted otherwise.
- 4) Costs do not include potential hazardous remediation.
- 5) No Property Acquisition required

# EVRWA-Nova Canal Flood Control Samuel Butts Park Pump Station and Force Main

## PRELIMINARY OPINION OF PROBABLE COST

ITEM NO.	DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL
1	Mobilization	1	LS	\$ 20,000	\$ 20,000
2	Clearing and Grubbing	10	AC	\$ 80,000	\$ 800,000
3	Excavation, Grading and Dewatering	375,000	CY	\$ 4	\$ 1,500,000
4	<b>550 cfs Pump Station</b>				
	185 cfs Pump	3	EA	\$ 960,000	\$ 2,880,000
	Concrete Structure	1	LS	\$ 575,000	\$ 575,000
	Electrical	1	LS	\$ 350,000	\$ 350,000
5	Stand By Generator - 2000 kw	1	LS	\$ 550,000	\$ 550,000
6	10' dia. Force Main	7200	LF	\$ 1,200	\$ 8,640,000
7	Jack & Bore 10' dia FM in 14' dia Casing	300	LF	\$ 3,500	\$ 1,050,000
8	FM Pipe End Treatment/Structure	1	LS	\$ 50,000	\$ 50,000
9	Triple 3' x 5' Box Culvert -Nova Cnl to Pond	1700	LF	\$ 1,500	\$ 2,550,000
10	48-inch Culvert - Connecting Ponds	2900	LF	\$ 200	\$ 580,000
11	Utility Adjustments	1	LS	\$ 500,000	\$ 500,000
12	Power Upgrade to Site	1	LS	\$ 200,000	\$ 200,000
13	Golf Course Restoration	1	LS	\$ 100,000	\$ 100,000
14	Road Restoration	1	LS	\$ 150,000	\$ 150,000
15	Miscellaneous Restoration	1	LS	\$ 200,000	\$ 200,000
16	School Property Acquisition	9	AC	tbd	tbd
	<b>Subtotal</b>				\$ 20,695,000
	<b>Contingency (30%)</b>				\$ 6,209,000
	<b>Engineering, Surveying and Permitting(15%)</b>				\$ 3,104,000
	<b>Total Estimated Project Component Cost</b>				<b>\$ 30,008,000</b>

**Notes:**

- 1) Costs are in 2009 dollars
- 2) Costs do not include wetland mitigation, maintenance, or monitoring
- 3) Costs do not include replacement, relocation, or rehabilitation of non-stormwater infrastructure unless noted otherwise.
- 4) Costs do not include potential hazardous remediation.
- 5) School property cost to be determined (tbd).
- 6) Excavation includes pond (9ac) at school board property and 20 acres at golf course, average 8 feet depth.

**EVRWA-Nova Canal Flood Control  
Buschman Pond Pump Station - at Halifax Canal**

**PRELIMINARY OPINION OF PROBABLE COST**

<b>ITEM NO.</b>	<b>DESCRIPTION</b>	<b>QTY</b>	<b>UNIT</b>	<b>UNIT COST</b>	<b>TOTAL</b>
<b>1</b>	<b>Mobilization</b>	1	LS	\$ 20,000	\$ 20,000
<b>2</b>	<b>Clearing and Grubbing</b>	59	AC	\$ 8,000	\$ 472,000
<b>3</b>	<b>Excavation and Grading</b>	760,000	CY	\$ 4	\$ 3,040,000
<b>4</b>	<b>300 cfs Pump Station</b>				
	100 cfs Pump	3	EA	\$ 825,000	\$ 2,475,000
	Concrete Structure	1	LS	\$ 350,000	\$ 350,000
	Electrical incl building	1	LS	\$ 250,000	\$ 250,000
<b>5</b>	<b>Stand By Generator (750 kw)</b>	1	LS	\$ 350,000	\$ 350,000
<b>6</b>	<b>8' dia. Force Main</b>	4800	LF	\$ 1,000	\$ 4,800,000
<b>7</b>	<b>8' x 10' Box Culvert Intake to P.S.</b>	100	LF	\$ 1,800	\$ 180,000
<b>8</b>	<b>Jack &amp; Bore 8' dia FM in 12' dia Casing</b>	300	LF	\$ 3,500	\$ 1,050,000
<b>9</b>	<b>Tide Control Gate including concrete structure</b>	1	LS	\$ 750,000	\$ 750,000
<b>10</b>	<b>Access Road</b>	1	LS	\$ 20,000	\$ 20,000
<b>11</b>	<b>Erosion Control at Outfall</b>	1	LS	\$ 50,000	\$ 50,000
<b>12</b>	<b>Power Upgrade to Site</b>	1	LS	\$ 200,000	\$ 200,000
<b>13</b>	<b>Utility Relocation</b>	1	LS	\$ 100,000	\$ 100,000
<b>14</b>	<b>Dbl 8'x 5' Box Culvert at Ryanwood</b>	75	LF	\$ 2,500	\$ 187,500
<b>15</b>	<b>Dbl 8'x 5' Box Culvert at Jackson Street</b>	75	LF	\$ 2,500	\$ 187,500
<b>14</b>	<b>Channel Widening (20-ft additional)</b>	500	LF	\$ 130	\$ 65,000
<b>15</b>	<b>Miscellaneous Restoration</b>	1	LS	\$ 200,000	\$ 200,000
<b>16</b>	<b>Property Acquisitions</b>				
	Dagwood Circle	5	AC	tbd	tbd
	NE Corner of Madeline and Nova(Wal-Mart)	16	AC	tbd	tbd
	Thompson Property	20	AC	tbd	tbd
	McDonald Property	18	AC	tbd	tbd
	<b>Subtotal</b>				\$ 14,747,000
	<b>Contingency (30%)</b>				\$ 4,424,000
	<b>Engineering, Surveying and Permitting(15%)</b>				\$ 2,212,000
	<b>Total Estimated Project Component Cost</b>				<b>\$ 21,383,000</b>

**Notes:**

- 1) Costs are in 2009 dollars
- 2) Costs do not include wetland mitigation, maintenance, or monitoring
- 3) Costs do not include replacement, relocation, or rehabilitation of non-stormwater infrastructure unless noted otherwise.
- 4) Costs do not include potential hazardous remediation.
- 5) Property Acquisition costs are to be determined
- 6) Excavation and Grading costs are for construction of ponds on acquired properties.

# EVRWA-Nova Canal Flood Control LPGA Canal Pump Station with Force Main at Sica Hall

## PRELIMINARY OPINION OF PROBABLE COST

ITEM NO.	DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL
1	Mobilization	1	LS	\$ 20,000	\$ 20,000
2	Clearing and Grubbing	1	AC	\$ 15,000	\$ 15,000
3	Excavation, Grading and Dewatering	225,000	CY	\$ 4	\$ 900,000
4	<b>500 cfs Pump Station</b>				
	168 cfs Pump	3	EA	\$ 968,000	\$ 2,904,000
	Concrete Structure	1	LS	\$ 550,000	\$ 550,000
	Electrical incl building	1	LS	\$ 350,000	\$ 350,000
5	Standby Generator - 1500 kw	1	LS	\$ 500,000	\$ 500,000
6	Tide Control Gate including concrete structure	1	LS	\$ 750,000	\$ 750,000
7	8' dia. Force Main	700	LF	\$ 1,200	\$ 840,000
8	FM Pipe End Treatment/Structure	1	LS	\$ 50,000	\$ 50,000
9	Access Road	1	LS	\$ 10,000	\$ 10,000
10	Power Upgrade to Site	1	LS	\$ 200,000	\$ 200,000
11	Gravity Wall	360	LF	\$ 500	\$ 180,000
12	Peterson Court Restoration	500	LF	\$ 200	\$ 100,000
13	Property Purchase on Peterson Court	1	LS	\$ 150,000	\$ 150,000
14	Miscellaneous Restoration	1	LS	\$ 200,000	\$ 200,000
13	School Property Acquisition	15	AC	tbd	tbd
	<b>Subtotal</b>				<b>\$ 7,719,000</b>
	<b>Contingency (30%)</b>				<b>\$ 2,316,000</b>
	<b>Engineering, Surveying and Permitting(15%)</b>				<b>\$ 1,158,000</b>
	<b>Total Estimated Project Component Cost</b>				<b>\$ 11,193,000</b>

**Notes:**

- 1) Estimated Tide Gate cost
- 2) Costs are in 2009 dollars
- 3) Costs do not include wetland mitigation, maintenance, or monitoring
- 4) Costs do not include replacement, relocation, or rehabilitation of non-stormwater infrastructure unless noted otherwise.
- 5) Costs do not include potential hazardous remediation.
- 6) School property identified is a portion of Holly Hill Middle School - cost to be determined (tbd).
- 7) Excavation includes pond at school board property

# EVRWA-Nova Canal Flood Control Reed Canal Pump Station - 500 cfs with Force Main

## PRELIMINARY OPINION OF PROBABLE COST

ITEM NO.	DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL
1	<b>Mobilization</b>	1	LS	\$ 20,000	\$ 20,000
2	<b>Clearing and Grubbing</b>	2	AC	\$ 10,000	\$ 20,000
3	<b>Excavation and Grading</b>	75,000	CY	\$ 4	\$ 300,000
4	<b>500 cfs Pump Station</b>				
	167 cfs Pump	3	EA	\$ 955,000	\$ 2,865,000
	Concrete Structure	1	LS	\$ 550,000	\$ 550,000
	Electrical	1	LS	\$ 350,000	\$ 350,000
5	<b>Stand By Generator (1500 kw)</b>	1	LS	\$ 500,000	\$ 500,000
6	<b>10' dia. Force Main</b>	1100	LF	\$ 1,200	\$ 1,320,000
7	<b>Jack &amp; Bore 10' dia FM in 14' dia Casing</b>	100	LF	\$ 3,500	\$ 350,000
6	<b>Tide Control Gate including concrete structure</b>	1	LS	\$ 750,000	\$ 750,000
7	<b>Access Road</b>	1	LS	\$ 20,000	\$ 20,000
8	<b>Pipe Termination Structure</b>	1	LS	\$ 100,000	\$ 100,000
9	<b>Power Upgrade to Site</b>	1	LS	\$ 200,000	\$ 200,000
10	<b>Utility Relocation</b>	1	LS	\$ 100,000	\$ 100,000
11	<b>Miscellaneous Restoration</b>	1	LS	\$ 200,000	\$ 200,000
12	<b>Easement Acquisition for Force Main route</b>	1	LS	\$ 250,000	\$ 250,000
	<b>Subtotal</b>				\$ 7,895,000
	<b>Contingency (30%)</b>				\$ 2,369,000
	<b>Engineering, Surveying and Permitting(15%)</b>				\$ 1,184,000
	<b>Total Estimated Project Component Cost</b>				<b>\$ 11,448,000</b>

**Notes:**

- 1) Costs are in 2009 dollars
- 2) Costs do not include wetland mitigation, maintenance, or monitoring
- 3) Costs do not include replacement, relocation, or rehabilitation of non-stormwater infrastructure unless noted otherwise.
- 4) Costs do not include potential hazardous remediation.
- 5) Property acquisition is not needed, South Daytona owns pump station site.

**Appendix I**  
**Inundation and Damages**

**Mean Annual Flooding Extents - Alternative 4**

Location	Area Flooded >1 ft (ac)	
	Existing	Alternative 4
Unincorp. Volusia County		
Daytona Beach		
Holly Hill		
Ormond Beach		
Port Orange		
South Daytona		
Overall Study Area	361.4	304.2

**Mean Annual Approximate Cost of Damage**

Location	Potential Flood Damage (>1ft Flooding)	
	Existing	Alternative 4
Unincorp. Volusia County	\$ -	
Daytona Beach	\$ -	
Holly Hill	\$ -	
Ormond Beach	\$ -	
Port Orange	\$ -	
South Daytona	\$ -	
Overall Study Area	\$ 15,200,000	\$ 12,800,000

**Mean Annual Potential Savings**

Location	Potential Savings	
	Existing	Alternative 4
Unincorp. Volusia County	--	\$ -
Daytona Beach	--	\$ -
Holly Hill	--	\$ -
Ormond Beach	--	\$ -
Port Orange	--	\$ -
South Daytona	--	\$ -
Overall Study Area	\$ -	\$ (2,400,000)

**Basis for Estimate:**

- 1) Homes per acre 2
- 2) Flood Damage per home \$ 21,000
- 3) Flood Damage per acre \$ 42,000
- 4) Developed area (structures) 100%

**5-Year Flooding Extents - Alternative 4**

Location	Area Flooded >1 ft (ac)	
	Existing	Alternative 4
Unincorp. Volusia County		
Daytona Beach		
Holly Hill		
Ormond Beach		
Port Orange		
South Daytona		
Overall Study Area	505.3	401.4

**5-Year Approximate Cost of Damage**

Location	Potential Flood Damage (>1ft Flooding)	
	Existing	Alternative 4
Unincorp. Volusia County	\$ -	
Daytona Beach	\$ -	
Holly Hill	\$ -	
Ormond Beach	\$ -	
Port Orange	\$ -	
South Daytona	\$ -	
Overall Study Area	\$ 21,200,000	\$ 16,900,000

**5-Year Potential Savings**

Location	Potential Savings	
	Existing	Alternative 4
Unincorp. Volusia County	--	\$ -
Daytona Beach	--	\$ -
Holly Hill	--	\$ -
Ormond Beach	--	\$ -
Port Orange	--	\$ -
South Daytona	--	\$ -
Overall Study Area	\$ -	\$ (4,300,000)

**Basis for Estimate:**

- 1) Homes per acre 2
- 2) Flood Damage per home \$ 21,000
- 3) Flood Damage per acre \$ 42,000
- 4) Developed area (structures) 100%

**10-Year Flooding Extents - Alternative 4**

Location	Area Flooded >1 ft (ac)	
	Existing	Alternative 4
Unincorp. Volusia County		
Daytona Beach		
Holly Hill		
Ormond Beach		
Port Orange		
South Daytona		
Overall Study Area	757.3	608.8

**10-Year Approximate Cost of Damage**

Location	Potential Flood Damage (>1ft Flooding)	
	Existing	Alternative 4
Unincorp. Volusia County	\$ -	
Daytona Beach	\$ -	
Holly Hill	\$ -	
Ormond Beach	\$ -	
Port Orange	\$ -	
South Daytona	\$ -	
Overall Study Area	\$ 31,800,000	\$ 25,600,000

**10-Year Potential Savings**

Location	Potential Savings	
	Existing	Alternative 4
Unincorp. Volusia County	--	\$ -
Daytona Beach	--	\$ -
Holly Hill	--	\$ -
Ormond Beach	--	\$ -
Port Orange	--	\$ -
South Daytona	--	\$ -
Overall Study Area	\$ -	\$ (6,200,000)

**Basis for Estimate:**

- 1) Homes per acre 2
- 2) Flood Damage per home \$ 21,000
- 3) Flood Damage per acre \$ 42,000
- 4) Developed area (structures) 100%

**25-Year Flooding Extents**

Location	Area Flooded >1 ft (ac)							
	Existing	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6	Alternative 7
Unincorp. Volusia County	13.6	13.4	n/a	13.3	12.5	12.4	12.3	12.1
Daytona Beach	600.4	598.4	n/a	495.2	440.6	365.3	364.9	363.2
Holly Hill	128.8	118.6	n/a	126.5	110.3	106.9	99.2	98.6
Ormond Beach	105.7	105.1	n/a	115.0	95.7	95.4	91.8	91.7
Port Orange	66.2	64.0	n/a	65.5	54.2	55.3	54.4	54.2
South Daytona	125.1	108.3	n/a	116.9	128.4	113.7	105.1	99.8
Overall Study Area	1,039.9	1,007.9	0.0	932.4	841.6	748.9	727.6	719.6

Note: Halifax Canal Alternative 1 acts as a parallel pumping configuration based on area topography and discharge location

**25-Year Approximate Cost of Damage**

Location	Potential Flood Damage (>1ft Flooding) (\$)							
	Existing	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6	Alternative 7
Unincorp. Volusia County	\$ 600,000	\$ 600,000	n/a	\$ 600,000	\$ 500,000	\$ 500,000	\$ 500,000	\$ 500,000
Daytona Beach	\$ 25,200,000	\$ 25,100,000	n/a	\$ 20,800,000	\$ 18,500,000	\$ 15,300,000	\$ 15,300,000	\$ 15,300,000
Holly Hill	\$ 5,400,000	\$ 5,000,000	n/a	\$ 5,300,000	\$ 4,600,000	\$ 4,500,000	\$ 4,200,000	\$ 4,100,000
Ormond Beach	\$ 4,400,000	\$ 4,400,000	n/a	\$ 4,800,000	\$ 4,000,000	\$ 4,000,000	\$ 3,900,000	\$ 3,800,000
Port Orange	\$ 2,800,000	\$ 2,700,000	n/a	\$ 2,800,000	\$ 2,300,000	\$ 2,300,000	\$ 2,300,000	\$ 2,300,000
South Daytona	\$ 5,300,000	\$ 4,500,000	n/a	\$ 4,900,000	\$ 5,400,000	\$ 4,800,000	\$ 4,400,000	\$ 4,200,000
Overall Study Area	\$ 43,700,000	\$ 42,300,000	\$ -	\$ 39,200,000	\$ 35,300,000	\$ 31,400,000	\$ 30,600,000	\$ 30,200,000

Note: Halifax Canal Alternative 1 acts as a parallel pumping configuration based on area topography and discharge location

**25-Year Potential Savings**

Location	Potential Savings							
	Existing	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6	Alternative 7
Unincorp. Volusia County	--	\$ -	n/a	\$ -	\$ (100,000)	\$ (100,000)	\$ (100,000)	\$ (100,000)
Daytona Beach	--	\$ (100,000)	n/a	\$ (4,400,000)	\$ (6,700,000)	\$ (9,900,000)	\$ (9,900,000)	\$ (9,900,000)
Holly Hill	--	\$ (400,000)	n/a	\$ (100,000)	\$ (800,000)	\$ (900,000)	\$ (1,200,000)	\$ (1,300,000)
Ormond Beach	--	\$ -	n/a	\$ 400,000	\$ (400,000)	\$ (400,000)	\$ (500,000)	\$ (600,000)
Port Orange	--	\$ (100,000)	n/a	\$ -	\$ (500,000)	\$ (500,000)	\$ (500,000)	\$ (500,000)
South Daytona	--	\$ (800,000)	n/a	\$ (400,000)	\$ 100,000	\$ (500,000)	\$ (900,000)	\$ (1,100,000)
Overall Study Area	\$ -	\$ (1,400,000)	\$ -	\$ (4,500,000)	\$ (8,400,000)	\$ (12,300,000)	\$ (13,100,000)	\$ (13,500,000)

Note: Halifax Canal Alternative 1 acts as a parallel pumping configuration based on area topography and discharge location

**Basis for Estimate:**

- 1) Homes per acre 2
- 2) Flood Damage per home \$ 21,000
- 3) Flood Damage per acre \$ 42,000
- 4) Developed area (structures) 100%

**100-Year Flooding Extents**

Location	Area Flooded >1 ft (ac)							
	Existing	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6	Alternative 7
Unincorp. Volusia County	24.4	24.2	n/a	24.0	22.8	22.5	22.3	22.1
Daytona Beach	1130.1	1128.3	n/a	1065.5	876.0	841.5	839.3	833.6
Holly Hill	259.5	248.8	n/a	254.0	218.2	212.9	203.5	197.6
Ormond Beach	160.1	159.6	n/a	167.4	136.9	136.2	135.7	135.4
Port Orange	138.8	137.5	n/a	137.6	115.0	117.0	116.7	115.1
South Daytona	290.1	268.4	n/a	273.7	284.1	265.7	254.3	237.6
Overall Study Area	2,003.0	1,966.8	0.0	1,922.2	1,653.1	1,595.6	1,571.8	1,541.6

Note: Halifax Canal Alternative 1 acts as a parallel pumping configuration based on area topography and discharge location

**100-Year Approximate Cost of Damage**

Location	Potential Flood Damage (>1ft Flooding) (\$)							
	Existing	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6	Alternative 7
Unincorp. Volusia County	\$ 1,000,000	\$ 1,000,000	n/a	\$ 1,000,000	\$ 1,000,000	\$ 900,000	\$ 900,000	\$ 900,000
Daytona Beach	\$ 47,500,000	\$ 47,400,000	n/a	\$ 44,800,000	\$ 36,800,000	\$ 35,300,000	\$ 35,200,000	\$ 35,000,000
Holly Hill	\$ 10,900,000	\$ 10,500,000	n/a	\$ 10,700,000	\$ 9,200,000	\$ 8,900,000	\$ 8,500,000	\$ 8,300,000
Ormond Beach	\$ 6,700,000	\$ 6,700,000	n/a	\$ 7,000,000	\$ 5,700,000	\$ 5,700,000	\$ 5,700,000	\$ 5,700,000
Port Orange	\$ 5,800,000	\$ 5,800,000	n/a	\$ 5,800,000	\$ 4,800,000	\$ 4,900,000	\$ 4,900,000	\$ 4,800,000
South Daytona	\$ 12,200,000	\$ 11,300,000	n/a	\$ 11,500,000	\$ 11,900,000	\$ 11,200,000	\$ 10,700,000	\$ 10,000,000
Overall Study Area	\$ 84,100,000	\$ 82,700,000	\$ -	\$ 80,800,000	\$ 69,400,000	\$ 66,900,000	\$ 65,900,000	\$ 64,700,000

Note: Halifax Canal Alternative 1 acts as a parallel pumping configuration based on area topography and discharge location

**100-Year Potential Savings**

Location	Potential Savings							
	Existing	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6	Alternative 7
Unincorp. Volusia County	--	\$ -	n/a	\$ -	\$ -	\$ (100,000)	\$ (100,000)	\$ (100,000)
Daytona Beach	--	\$ (100,000)	n/a	\$ (2,700,000)	\$ (10,700,000)	\$ (12,200,000)	\$ (12,300,000)	\$ (12,500,000)
Holly Hill	--	\$ (400,000)	n/a	\$ (200,000)	\$ (1,700,000)	\$ (2,000,000)	\$ (2,400,000)	\$ (2,600,000)
Ormond Beach	--	\$ -	n/a	\$ 300,000	\$ (1,000,000)	\$ (1,000,000)	\$ (1,000,000)	\$ (1,000,000)
Port Orange	--	\$ -	n/a	\$ -	\$ (1,000,000)	\$ (900,000)	\$ (900,000)	\$ (1,000,000)
South Daytona	--	\$ (900,000)	n/a	\$ (700,000)	\$ (300,000)	\$ (1,000,000)	\$ (1,500,000)	\$ (2,200,000)
Overall Study Area	\$ -	\$ (1,400,000)	\$ -	\$ (3,300,000)	\$ (14,700,000)	\$ (17,200,000)	\$ (18,200,000)	\$ (19,400,000)

Note: Halifax Canal Alternative 1 acts as a parallel pumping configuration based on area topography and discharge location

**Basis for Estimate:**

- 1) Homes per acre 2
- 2) Flood Damage per home \$ 21,000
- 3) Flood Damage per acre \$ 42,000
- 4) Developed area (structures) 100%

**May 2009 Flooding Extents**

Location	Area Flooded >1 ft (ac)							
	Existing	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6	Alternative 7
Unincorp. Volusia County	19.6	19.1	n/a	18.8	15.8	14.7	14.0	14.4
Daytona Beach	519.2	505.8	n/a	438.7	159.9	171.4	165.6	169.3
Holly Hill	272.5	262.4	n/a	254.8	160.5	147.5	130.5	139.4
Ormond Beach	234.9	231.0	n/a	232.8	166.0	164.1	159.4	163.3
Port Orange	94.5	90.4	n/a	91.8	61.1	58.9	56.5	56.0
South Daytona	90.4	81.9	n/a	79.2	70.0	62.9	60.3	59.2
Overall Study Area	1,231.0	1,190.5	0.0	1,116.2	633.2	619.5	586.4	601.6

Note: Halifax Canal Alternative 1 acts as a parallel pumping configuration based on area topography and discharge location

**May 2009 Approximate Cost of Damage**

Location	Potential Flood Damage (>1ft Flooding) (\$)							
	Existing	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6	Alternative 7
Unincorp. Volusia County	\$ 800,000	\$ 800,000	n/a	\$ 800,000	\$ 700,000	\$ 600,000	\$ 600,000	\$ 600,000
Daytona Beach	\$ 21,800,000	\$ 21,200,000	n/a	\$ 18,400,000	\$ 6,700,000	\$ 7,200,000	\$ 7,000,000	\$ 7,100,000
Holly Hill	\$ 11,400,000	\$ 11,000,000	n/a	\$ 10,700,000	\$ 6,700,000	\$ 6,200,000	\$ 5,500,000	\$ 5,900,000
Ormond Beach	\$ 9,900,000	\$ 9,700,000	n/a	\$ 9,800,000	\$ 7,000,000	\$ 6,900,000	\$ 6,700,000	\$ 6,900,000
Port Orange	\$ 4,000,000	\$ 3,800,000	n/a	\$ 3,900,000	\$ 2,600,000	\$ 2,500,000	\$ 2,400,000	\$ 2,400,000
South Daytona	\$ 3,800,000	\$ 3,400,000	n/a	\$ 3,300,000	\$ 2,900,000	\$ 2,600,000	\$ 2,500,000	\$ 2,500,000
Overall Study Area	\$ 51,700,000	\$ 49,900,000	\$ -	\$ 46,900,000	\$ 26,600,000	\$ 26,000,000	\$ 24,700,000	\$ 25,400,000

Note: Halifax Canal Alternative 1 acts as a parallel pumping configuration based on area topography and discharge location

**May 2009 Potential Savings**

Location	Potential Savings							
	Existing	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6	Alternative 7
Unincorp. Volusia County	--	\$ -	n/a	\$ -	\$ (100,000)	\$ (200,000)	\$ (200,000)	\$ (200,000)
Daytona Beach	--	\$ (600,000)	n/a	\$ (3,400,000)	\$ (15,100,000)	\$ (14,600,000)	\$ (14,800,000)	\$ (14,700,000)
Holly Hill	--	\$ (400,000)	n/a	\$ (700,000)	\$ (4,700,000)	\$ (5,200,000)	\$ (5,900,000)	\$ (5,500,000)
Ormond Beach	--	\$ (200,000)	n/a	\$ (100,000)	\$ (2,900,000)	\$ (3,000,000)	\$ (3,200,000)	\$ (3,000,000)
Port Orange	--	\$ (200,000)	n/a	\$ (100,000)	\$ (1,400,000)	\$ (1,500,000)	\$ (1,600,000)	\$ (1,600,000)
South Daytona	--	\$ (400,000)	n/a	\$ (500,000)	\$ (900,000)	\$ (1,200,000)	\$ (1,300,000)	\$ (1,300,000)
Overall Study Area	\$ -	\$ (1,800,000)	\$ -	\$ (4,800,000)	\$ (25,100,000)	\$ (25,700,000)	\$ (27,000,000)	\$ (26,300,000)

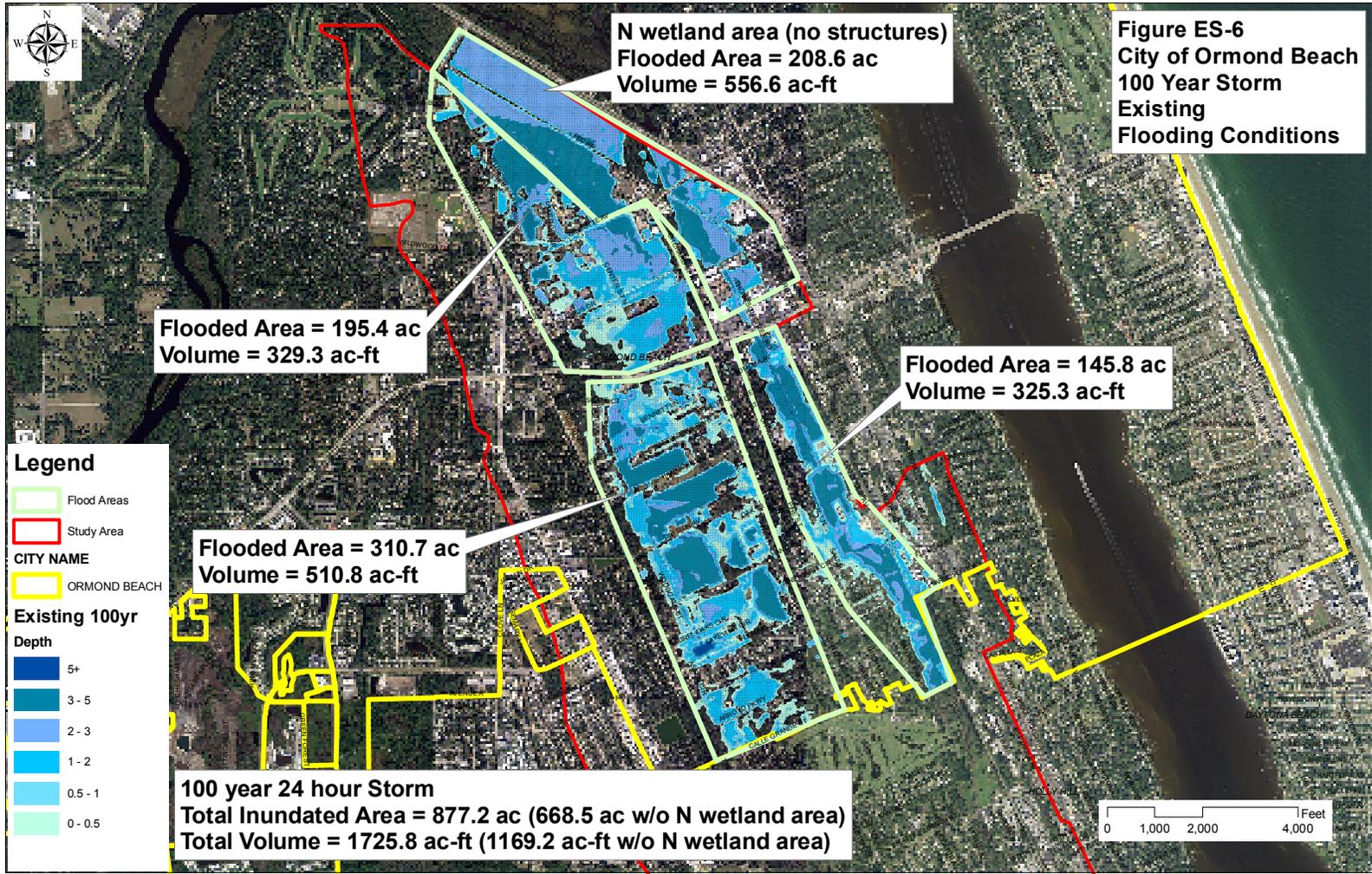
Note: Halifax Canal Alternative 1 acts as a parallel pumping configuration based on area topography and discharge location

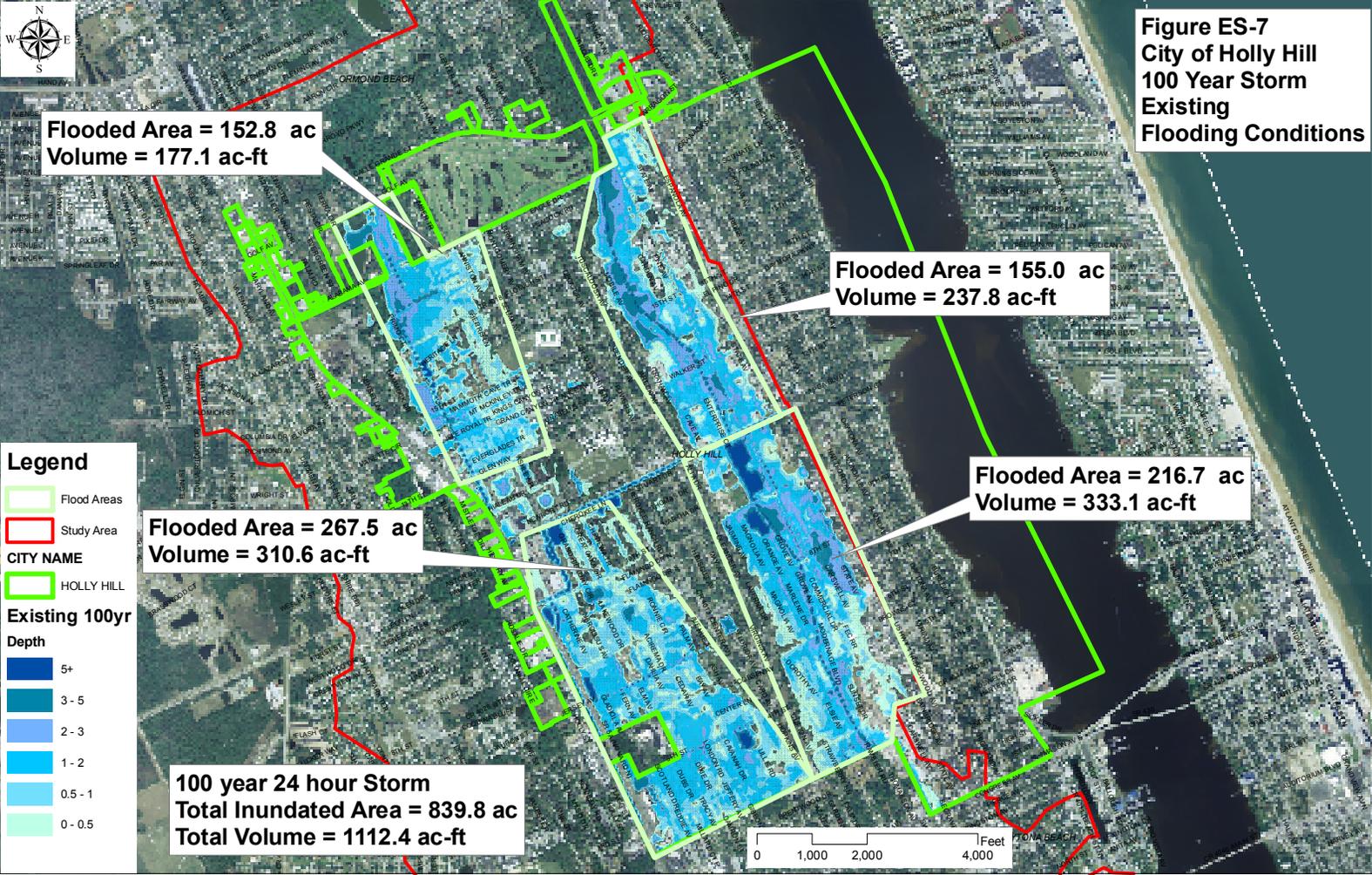
**Basis for Estimate:**

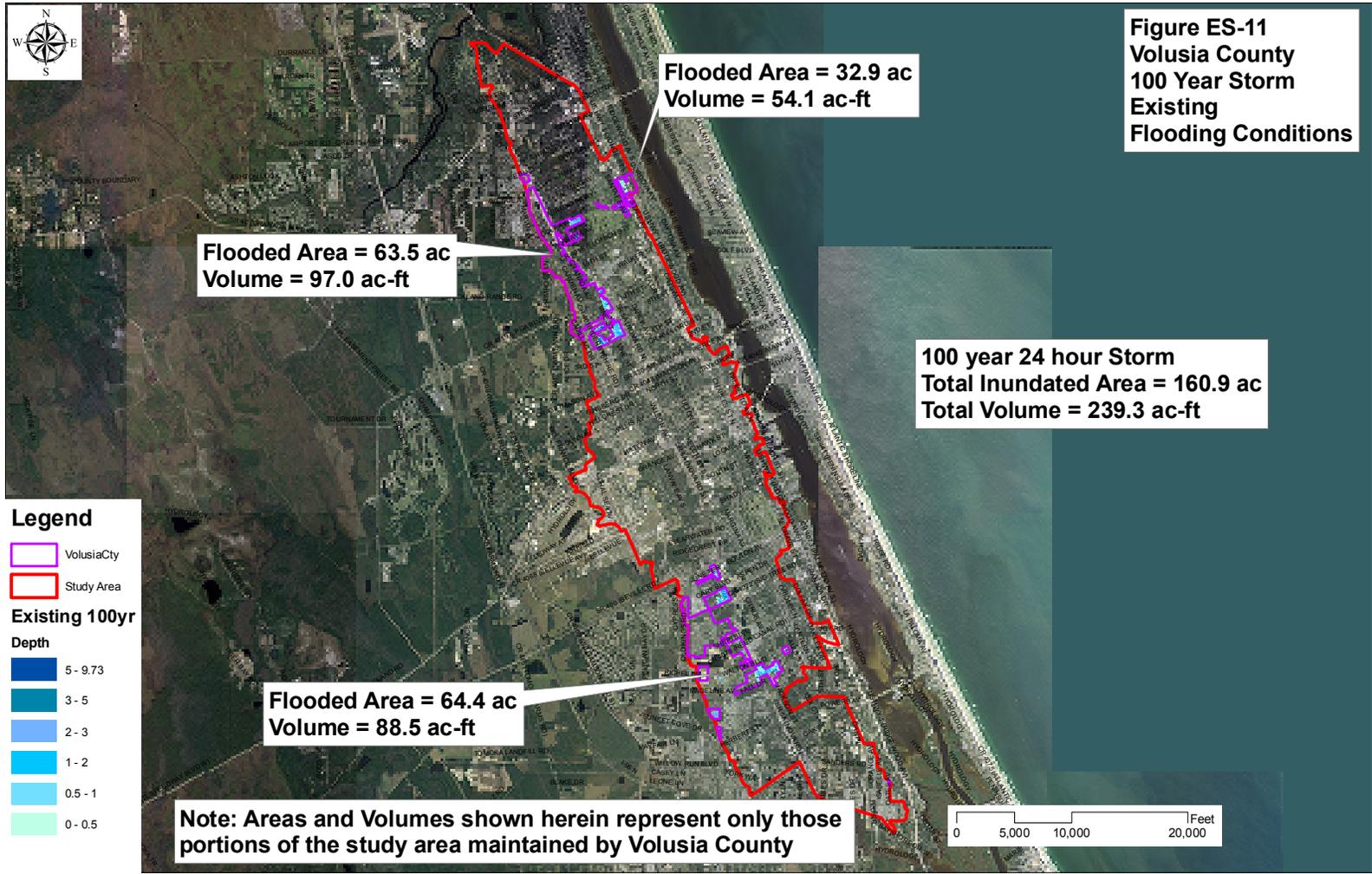
- 1) Homes per acre 2
- 2) Flood Damage per home \$ 21,000
- 3) Flood Damage per acre \$ 42,000
- 4) Developed area (structures) 100%

# **Appendix J**

## **100-Year Storage Volumes**









**Figure ES-8**  
**City of Daytona Beach**  
**100 Year Storm**  
**Existing**  
**Flooding Conditions**

**Flooded Area = 584.4 ac**  
**Volume = 680.8 ac-ft**  
**(tributary to North Street pond)**

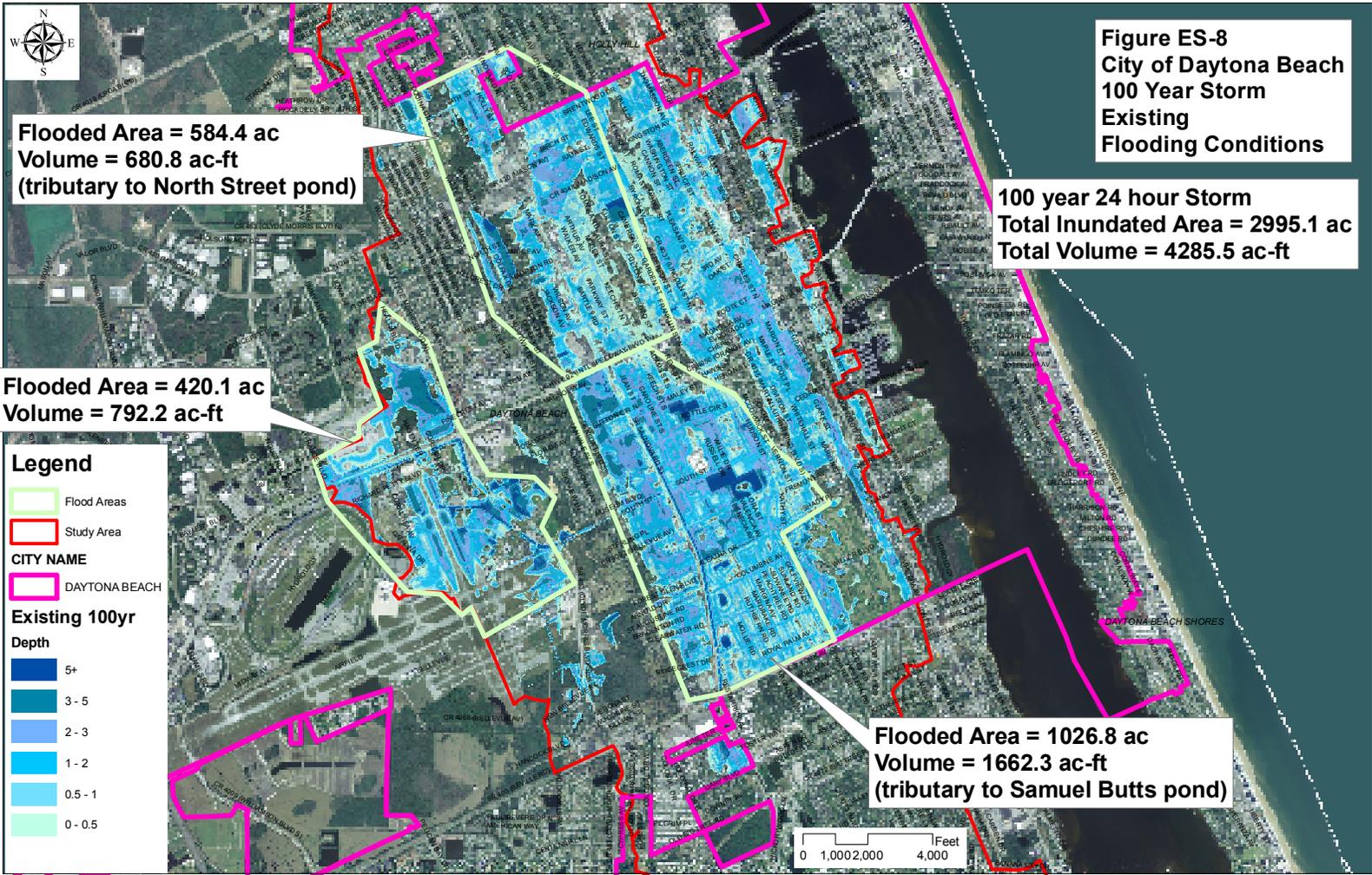
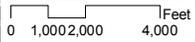
**100 year 24 hour Storm**  
**Total Inundated Area = 2995.1 ac**  
**Total Volume = 4285.5 ac-ft**

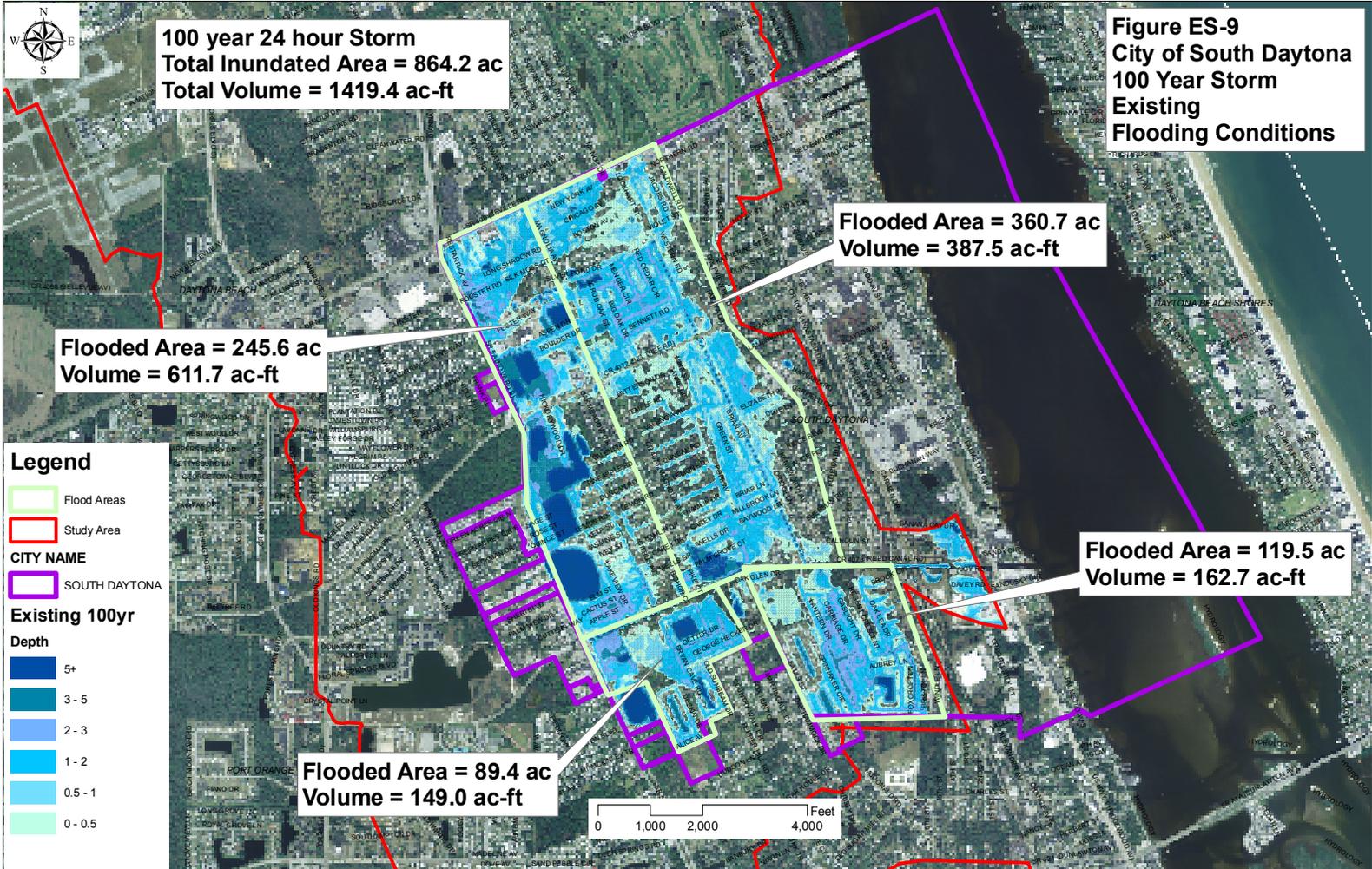
**Flooded Area = 420.1 ac**  
**Volume = 792.2 ac-ft**

**Legend**

- Flood Areas
- Study Area
- CITY NAME
- DAYTONA BEACH
- Existing 100yr
- Depth
- 5+
- 3-5
- 2-3
- 1-2
- 0.5-1
- 0-0.5

**Flooded Area = 1026.8 ac**  
**Volume = 1662.3 ac-ft**  
**(tributary to Samuel Butts pond)**





**Figure ES-10  
City of Port Orange  
100 Year Storm  
Existing  
Flooding Conditions**

