

# Rhode Island Airport Corporation

**Third Quarter 2021**

**Outfall Sampling**

**T.F. Green Airport**

Prepared by:  
Rhode Island Airport Corporation

October 2021

## **Background**

The RIPDES permit identifies a total of 16 perimeter outfalls at PVD. Outfalls 001A, 002A, 003A, 004A and 013A discharge to tributaries of Warwick Pond. Outfalls, 006A, 006B, 006C, 006D, 007A, 007B, 008A and 009A discharge to tributaries of Buckeye Brook downstream of Warwick Pond. Outfalls 010A, 011A, and 012A discharge to Tuscatucket Brook. Major outfalls, 002A, 003A, 008A, and 010A, are those outfalls which receive or may receive drainage from areas where aircraft deicing fluid is applied. Sampling for these major outfalls is defined at Part I.A.1 of the permit. Minor outfalls drain taxiways, runways and other paved services. Outfall 005A was combined with Outfall 006A during construction of Runway 34 Safety Area Improvements. Sampling for these minor outfalls is defined at Part I.A.2. of the permit. Additional sampling requirements are defined at Part I.A.5. and Parts I.C. and I.D. Table 1 lists parameters sampled. Figure 1 identifies outfall and in-stream sampling locations.

Industrial activities at PVD with the potential to impact stormwater quality include the use of glycol-based Aircraft Deicing and Anti-icing Fluids (ADFs/AAFs) and pavement deicers. Only propylene glycol (PG)-based ADFs/AAFs are used at PVD. Pavement deicers used at PVD include solid sodium formate, and liquid potassium acetate. No aircraft or pavement deicing material was applied during this event.

## **Summary of Storm**

Third Quarter (July 1 through September 30) sampling includes the major outfalls (002A, 003A, 008A and 010A) hourly for twelve hours.

Light rain began falling around 5:30 AM on September 16, 2021. Sampling commenced at 10:00 AM and continued until approximately 9:15 PM September 16, 2021.

A total of 0.08 inches of precipitation (as water equivalent) was measured at PVD during this event. Precipitation data is summarized in Table 2.

## **Summary of Flow**

Flow meters are installed at three of the major outfalls: OF-002A, OF-003A, and OF-008A. Continuous flow measurements during the 12 hours of sampling were made using these Isco 2150 area velocity meters programmed to measure level and velocity and produce flow rate (GPM) at 15 minute increments. No flow meters are installed at minor outfalls or at outfall 010A, as it is off airport property.

Maximum daily and average monthly flows for the major outfalls were calculated and are presented in Table 3. Estimated runoff volumes calculated using drainage area and depth of precipitation for all outfalls are presented in Table 5.

## **Sample Collection**

The laboratory analytical parameters for each sample for this event are listed in Table 2. For the Third Quarter sampling event the major outfalls (002A, 003A, 008A, and 010A) were sampled hourly for twelve hours. There was no observed flow at Outfall 010A in the last two hours of sampling, so no samples were taken. The major outfall sampling results can be found in Tables 3 and 4.

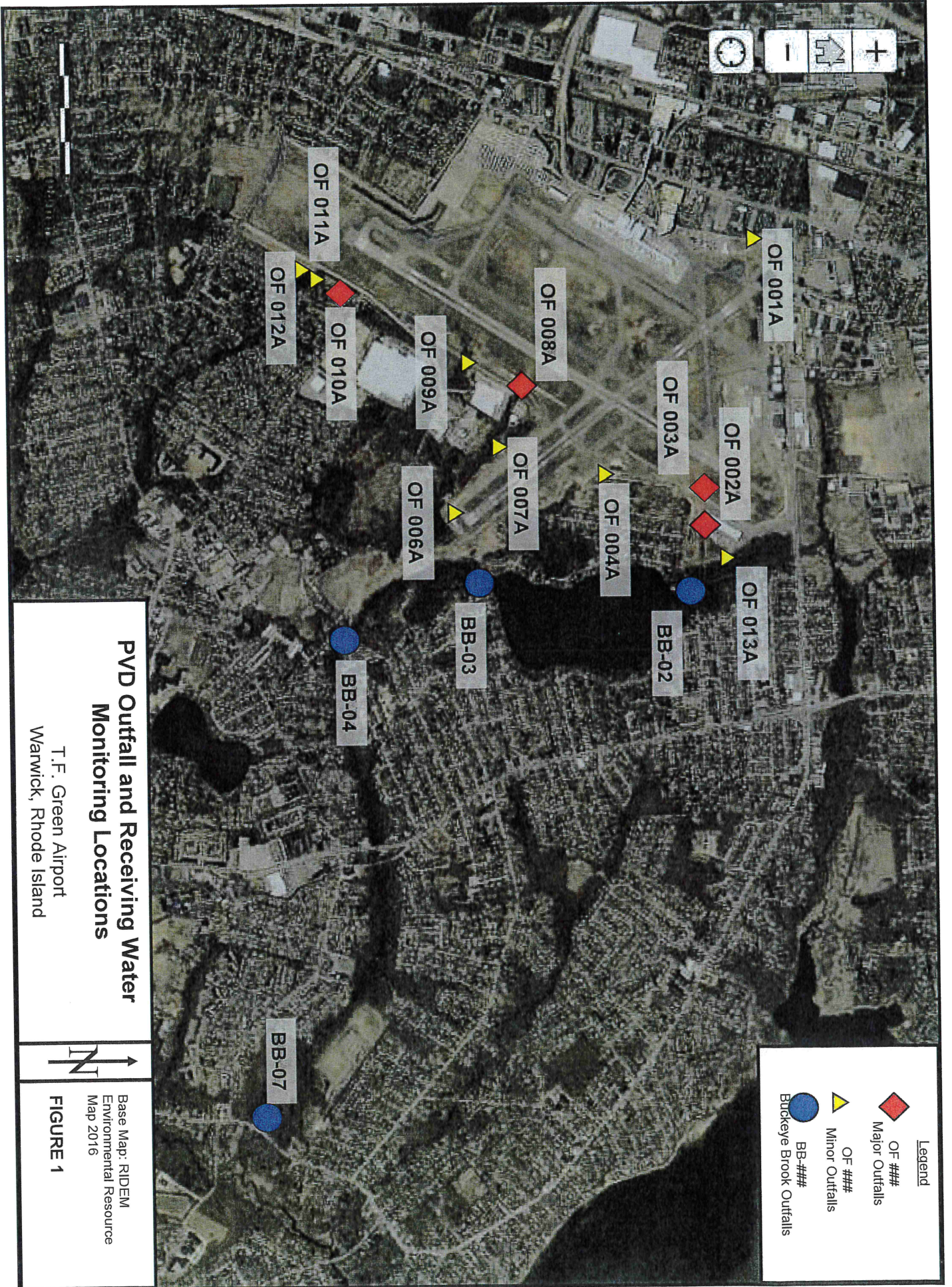
Samples were collected and decanted into sample bottles based on the analysis necessary. The bottles were then placed on ice in a cooler for transport to Rhode Island Analytical Laboratories (RIAL) for analysis. Because of the short sample holding time (six hours) for some of the analytical parameters, all samples collected in the first three hours were delivered to the laboratory immediately after the third hour. Samples collected in hours four through twelve were delivered at the completion of sampling.

RIAC also collected and recorded field measurements at each outfall for temperature, pH, specific conductance, and dissolved oxygen (DO).

## **Sampling Results**

Tables 3 and 4 present a summary of field measurements and analytical results expressed as monthly average and maximum daily concentrations for the major outfalls. Table values presented as zero reflect data that was non-detect. Temperature and Oil and Grease are expressed as maximum daily only. pH is expressed as minimum daily and maximum daily.





**Legend**

- OF ### Major Outfalls
- OF ### Minor Outfalls
- BB-### Buckeye Brook Outfalls

**PVD Outfall and Receiving Water  
Monitoring Locations**  
T.F. Green Airport  
Warwick, Rhode Island

Base Map: RIDEM  
Environmental Resource  
Map 2016  
**FIGURE 1**



**TABLE 1**  
**PRECIPITATION AMOUNTS**  
**T.F. GREEN AIRPORT**  
**WARWICK, RHODE ISLAND**  
**THIRD QUARTER 2021**  
**September 13 - 17, 2021**

<b>Date</b>	<b>Total Precipitation (water equivalent, in inches)</b>
September 13, 2021	0.00
September 14, 2021	0.00
September 15, 2021	0.00
September 16, 2021	0.08

TABLE 2  
 LABRATORY ANALYTICAL PARAMETERS  
 T.F. GREEN AIRPORT  
 WARWICK, RHODE ISLAND  
 THIRD QUARTER 2021

Sample Identification	Hours 1-3	Hours 4-12
OF-002A, OF-003A, OF-008A, OF-010A	<ul style="list-style-type: none"> <li>• Fecal coliform</li> <li>• BOD, Surfactants, Dissolved Oxygen</li> <li>• pH and Temperature</li> <li>• COD, TOC</li> <li>• Oil &amp; grease -1664, TSS</li> <li>• Propylene glycol</li> <li>• Dissolved Potassium and Sodium</li> <li>• Total Metals (aluminum, chromium, copper, iron, lead, and zinc)</li> </ul>	<ul style="list-style-type: none"> <li>• BOD, Surfactants, Dissolved Oxygen</li> <li>• pH and Temperature</li> <li>• COD, TOC</li> <li>• Propylene glycol</li> <li>• Dissolved Potassium and Sodium</li> <li>• Total Metals (aluminum, chromium, copper, iron, lead, and zinc)</li> </ul>

BOD -Biological oxygen demand  
 COD -Chemical oxygen demand  
 TOC -Total organic carbon  
 TSS -Total suspended solids

**TABLE 3  
ANALYTICAL RESULTS  
MAJOR OUTFALLS  
T.F. GREEN AIRPORT  
WARWICK, RHODE ISLAND  
THIRD QUARTER 2021**

Parameter	Major Outfalls							
	Outfall 002A		Outfall 003A		Outfall 008A		Outfall 010A	
	Average Monthly	Maximum Daily	Average Monthly	Maximum Daily	Average Monthly	Maximum Daily	Average Monthly	Maximum Daily
Flow (gpd) <sup>1,8</sup>	61,080	62,583	398,558	480,815	1,081,119	1,107,711	135,544	135,544
Oil & Grease (mg/l) <sup>5</sup>		0		0.7		0.6		0.5
TSS (mg/l) <sup>4,5</sup>	48.0	62	1.7	5.0	2.8	5.5	3.0	5
Fecal Coliform (MPN/100ml) <sup>7,5</sup>	16.7	46	168	260	29.2	49	90.9	140
BOD <sub>5</sub> (mg/l) <sup>2,6</sup>	3.7	11	0	0	0	0	0	0
Propylene Glycol (mg/l) <sup>2,6</sup>	0	0	0	0	0	0	0	0
COD (mg/l) <sup>2,6</sup>	22.4	110	1.6	20	0.0	0	0.0	0
Dissolved Potassium (mg/l) <sup>2,6</sup>	5.60	8.60	6.30	10.00	6.90	11.00	16.40	27.00
Dissolved Sodium (mg/l) <sup>2,6</sup>	6.10	10.00	22.00	33.00	69.10	110.00	4.90	8.10
Surfactants (ug/l) <sup>2,6</sup>	59.3	250	63.2	170	77.7	270	78.0	220
Dissolved Oxygen (mg/l) <sup>2,3</sup>	5.59	6.77	7.62	8.61	7.18	7.59	5.61	6.16
TOC (mg/l) <sup>2,6</sup>	5.40	19	1.05	1.9	1.18	1.7	0.68	0.9
Total Aluminum (ug/l) <sup>2,6</sup>	429.2	1200	0	0	0	0	0	0
Total Chromium (ug/l) <sup>2,6</sup>	1.1	3.7	0	0	0	0	0	0
Total Copper (ug/l) <sup>2,6</sup>	4.0	23	0	0	0	0	0	0
Total Iron (mg/l) <sup>2,6</sup>	23.62	41.0	1.08	1.70	1.09	1.90	1.73	2.80
Total Lead (ug/l) <sup>2,6</sup>	0	0	0	0	0	0	0	0
Total Zinc (ug/l) <sup>2,6</sup>	0	0	0	0	0	0	0	0

<sup>1</sup> Results reported as average monthly were determined using the arithmetic average of measurement made every 15 minutes during the 12 hours of sampling. Results reported as maximum daily was the maximum flow measurements over the 12 hours of sampling. Both reported values were converted from GPM to GPD reflecting a 24 hour day

<sup>2</sup> Results reported as maximum daily were the maximum of the 12 samples collected during the 12 hours of sampling.

<sup>3</sup> Results reported as average monthly were determined using the arithmetic average of the 12 samples collected during the 12 hours of sampling.

<sup>4</sup> Results reported as average monthly were determined using the arithmetic average of the 3 samples collected (when available) during the first 3 hours of sampling.

<sup>5</sup> Results reported as maximum daily were the maximum of the 3 samples collected (when available) during the first 3 hours of sampling

<sup>6</sup> Results reported as average monthly were determined by using a flow-weighted average of the 12 samples collected during the 12 hours of sampling.

<sup>7</sup> Results reported as average monthly were determined by using a geometric mean of the 3 samples collected (when available) during the 3 hours of sampling

<sup>8</sup> Outfall 010A: Results reported as average monthly were determined using the arithmetic average of rainfall amount during the entire storm for the outfall drainage area. Results reported as maximum daily was determined from maximum rainfall measurement for the duration of the storm for each outfall drainage area.

BOD<sub>5</sub> - Biological oxygen demand 5-day test

COD - Chemical oxygen demand

gpd - Gallons per day

mg/l - Milligrams per liter

TOC - Total organic carbon

TSS - Total suspended solids

ug/l - Micrograms per liter

**TABLE 4**  
**FIELD ANALYTICAL RESULTS**  
**MAJOR OUTFALLS**  
**T.F. GREEN AIRPORT**  
**WARWICK, RHODE ISLAND**  
**THIRD QUARTER 2021**

Parameter	Major Outfalls									
	Outfall 002A		Outfall 003A		Outfall 008A		Outfall 010A			
	Minimum Daily <sup>1</sup>	Maximum Daily <sup>2</sup>	Minimum Daily <sup>1</sup>	Maximum Daily <sup>2</sup>	Minimum Daily <sup>1</sup>	Maximum Daily <sup>2</sup>	Minimum Daily <sup>1</sup>	Maximum Daily <sup>2</sup>		
pH	6.6	6.8	6.8	7.0	6.5	7.0	6.6	6.8		
Temperature (°F)		68.8		67.1		66.0		68.0		

**Bold text** indicates exceedance of permit standards

<sup>1</sup> Results reported as minimum daily were the minimum of the samples collected during the 12 hours of sampling.

<sup>2</sup> Results reported as maximum daily were the maximum of the samples collected during the 12 hours of sampling.



**TABLE 5  
PVD RUNOFF VOLUME CALCULATION  
T.F. GREEN AIRPORT  
WARWICK, RHODE ISLAND  
THIRD QUARTER 2021**

September 16, 2021

Precip (inches): 0.08

Drainage Basin ID	PVD Storm Water Discharge	Receiving Water	Drainage Area (ac)	cu ft precip	gal precip
1	Outfall 001A	Warwick Pond	5.9	1,713.4	12,816
2	Outfall 002A	Warwick Pond	93.4	27,123.4	202,883
3	Outfall 003A	Warwick Pond	119.8	34,789.9	260,229
4	Outfall 004A	Warwick Pond	30.1	8,741.0	65,383
4B	Outfall 004B	Buckeye Brook	2	580.8	4,344
4C	Outfall 004C	Buckeye Brook	3	871.2	6,517
6	Outfall 006A	Buckeye Brook	10.7	3,107.3	23,242
6B	Outfall 006B	Buckeye Brook	1.5	435.6	3,258
6C	Outfall 006C	Buckeye Brook	0.8	232.3	1,738
6D	Outfall 006D	Buckeye Brook	0.7	203.3	1,521
7	Outfall 007A	Buckeye Brook	9.6	2,787.8	20,853
7B	Outfall 007B	Buckeye Brook	1.2	348.5	2,607
8	Outfall 008A	Buckeye Brook	240.6	69,870.2	522,629
9	Outfall 009A	Buckeye Brook	38.4	11,151.4	83,412
10	Outfall 010A	Tuscatucket Brook	26	7,550.4	56,477
11	Outfall 011A	Tuscatucket Brook	14	4,065.6	30,411
12	Outfall 012A	Tuscatucket Brook	46.4	13,474.6	100,790
13	Outfall 013A	Warwick Pond	28	8,131.2	60,821
<b>TOTAL AREA</b>			<b>672.1</b>	<b>195,177.8</b>	<b>1,459,930</b>

