

2003

Treatment of Stormwater Runoff from Snow Melt at the Portland Snow Dump: Stormwater Management in Cold Climates

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Treatment of Stormwater Runoff from Snow Melt at the Portland Snow Dump

Stormwater Management in Cold Climates

November 3-5, 2003

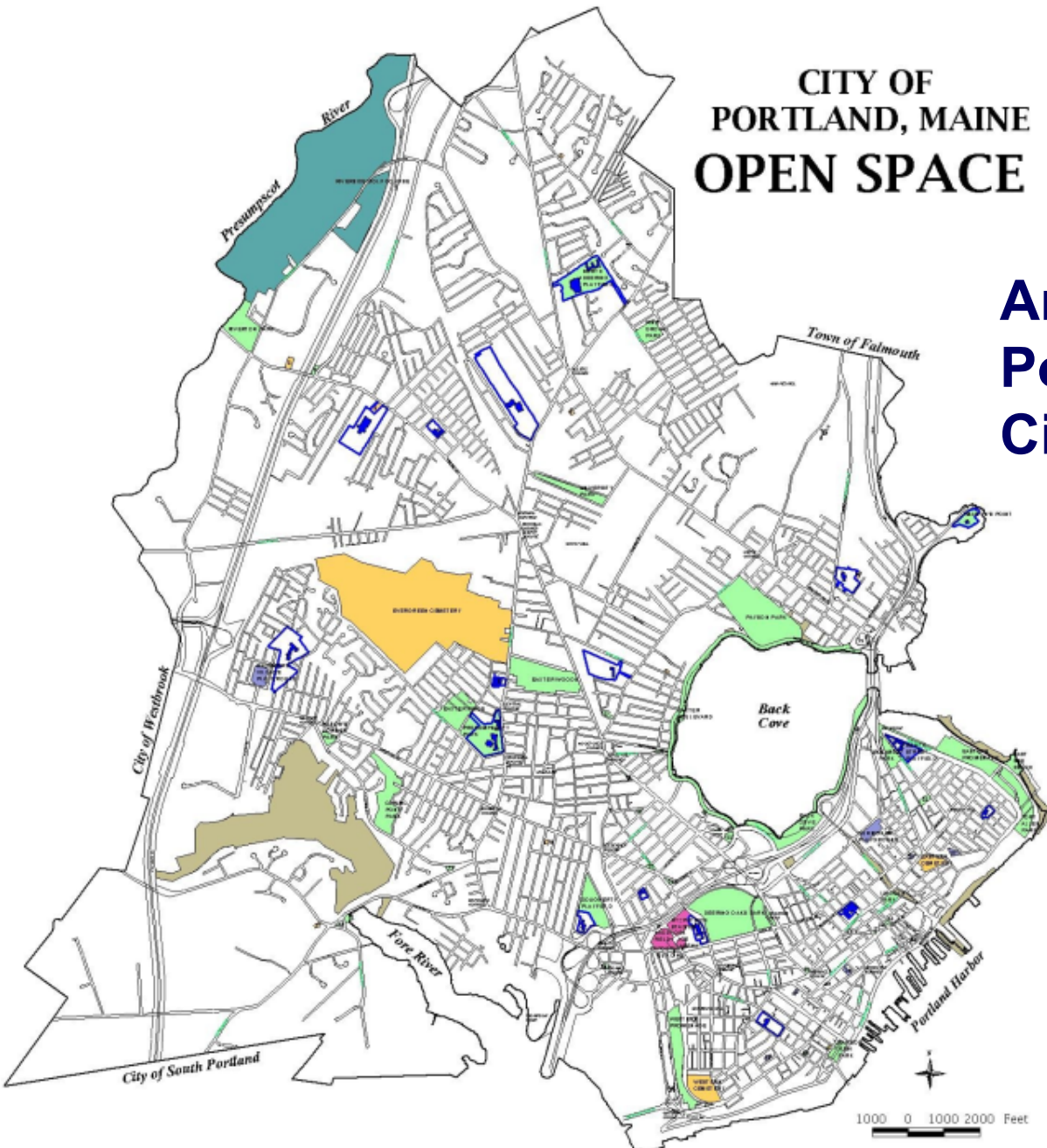
Portland, Maine



Presented By
Pamela Deahl
Vice-President

CITY OF PORTLAND, MAINE OPEN SPACE

Area: 21.2 sq. miles
Population: 64,250
City streets: 340 miles







Dumping Snow the old- fashioned way

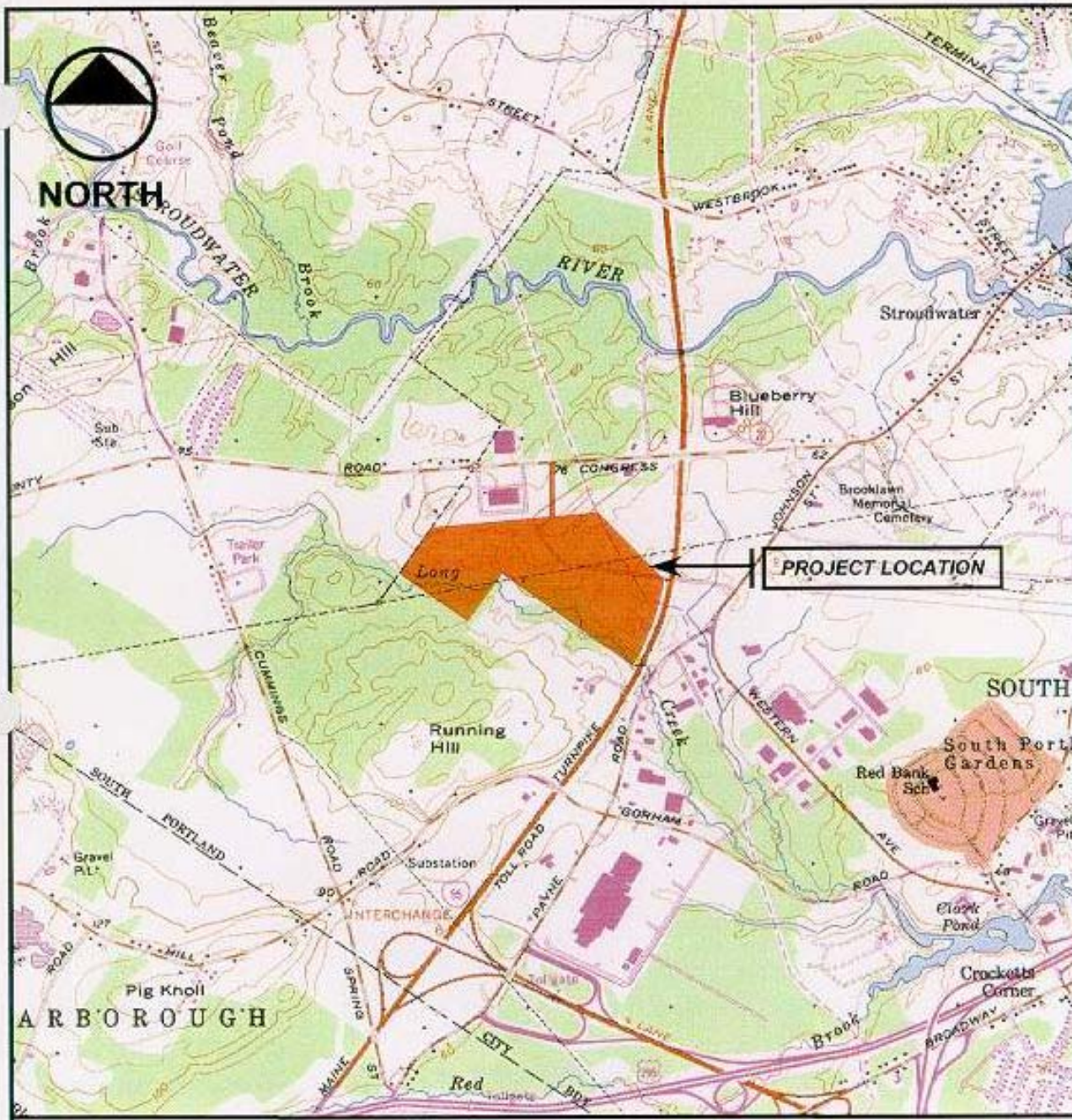


Non-Point Source Pollution

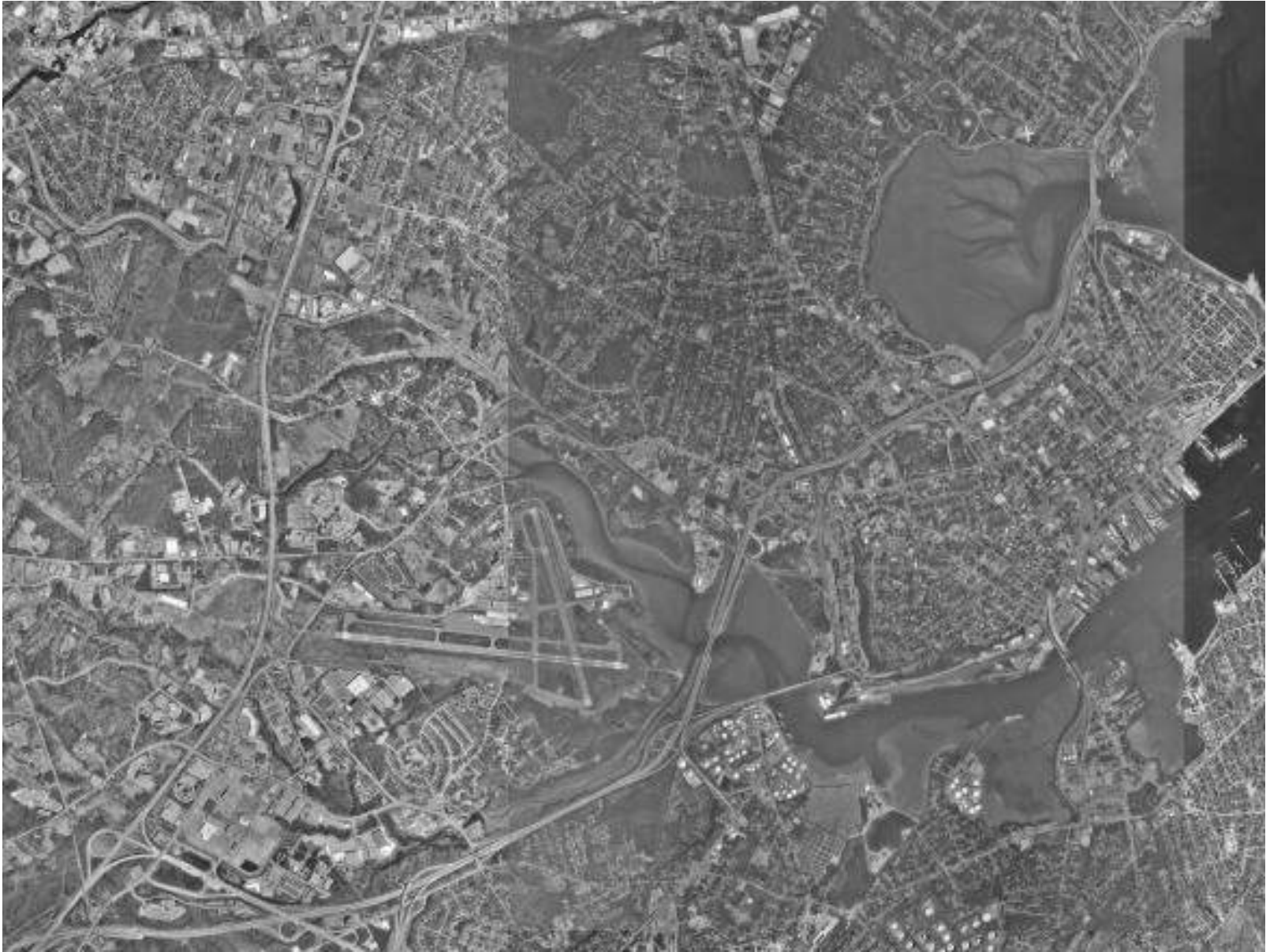


Non-Point Source Pollution





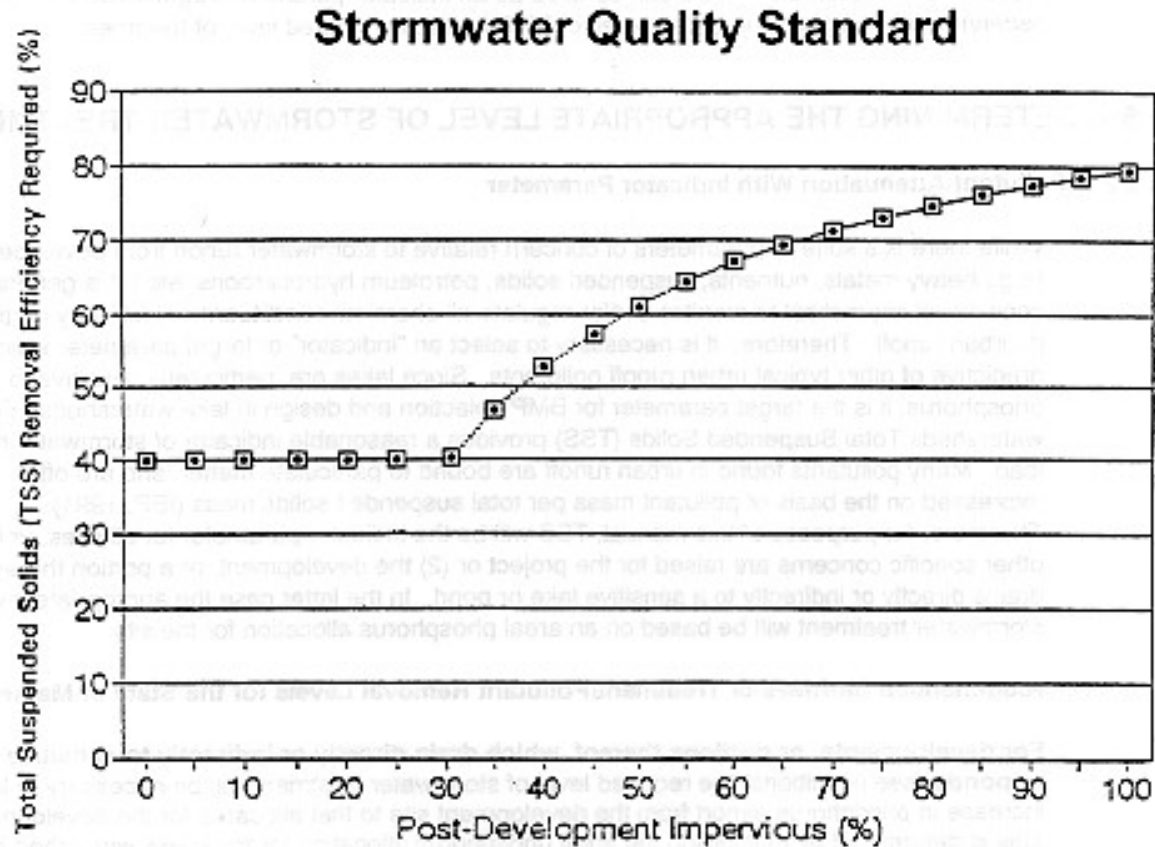
Fall 2000:
City changes
Snow
Dumping
Practices,
Establishing
Snow Dump
Site



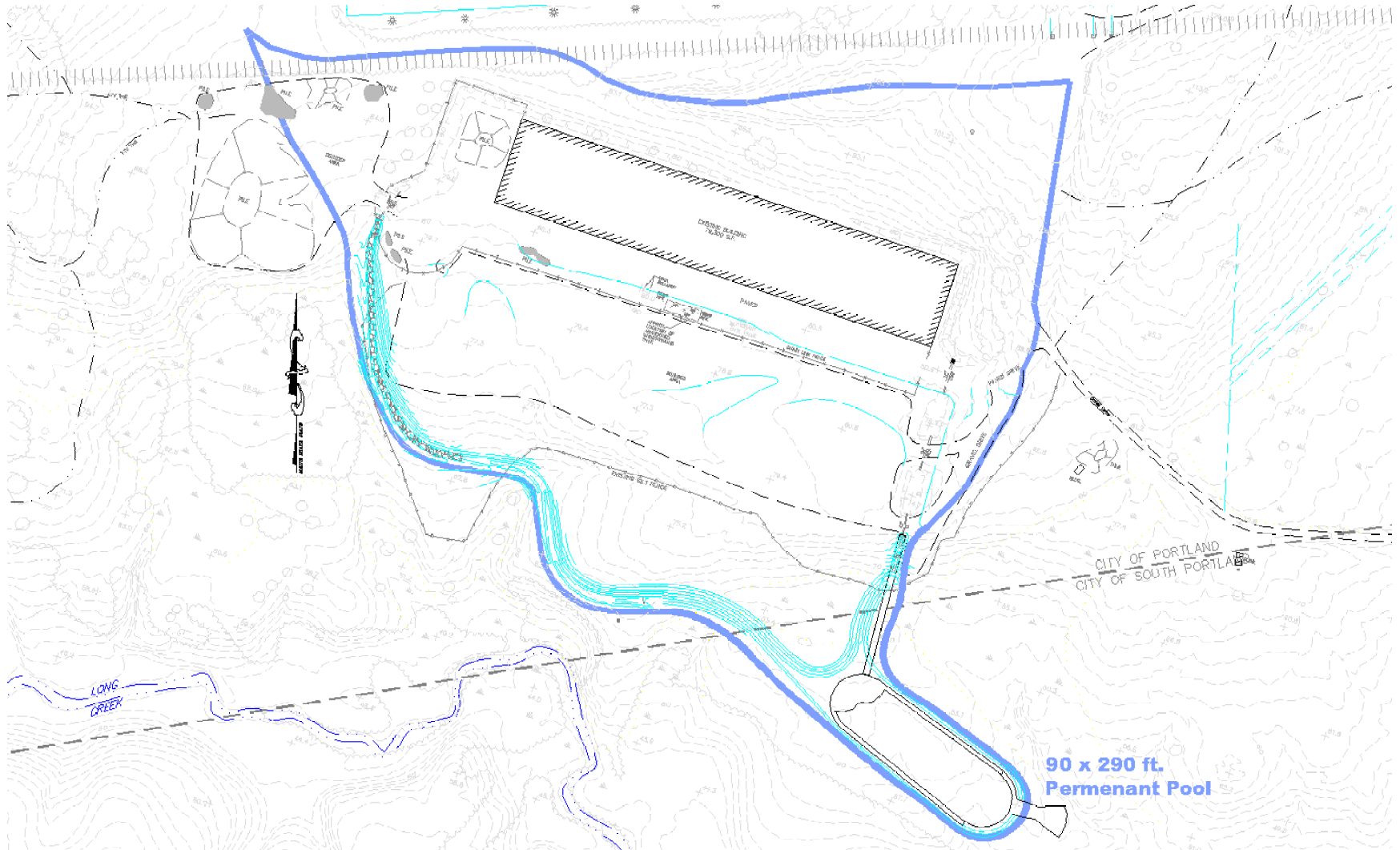
Design Considerations

- **88.26-acre site.**
- **6.05 acres of impervious surface (6.85%).**
- **40% TSS removal required.**
- **2-year pre-development = 12.98 cfs.**
- **2-year post-development = 19.83cfs.**
- **25-year pre-development = 45.77 cfs.**
- **25-year post-development = 57.7 cfs.**

MEDEP TSS Removal Requirement



Water Quality with Retention Facility



34 Species of Waterfowl in Maine







Airplane taking off from PWM



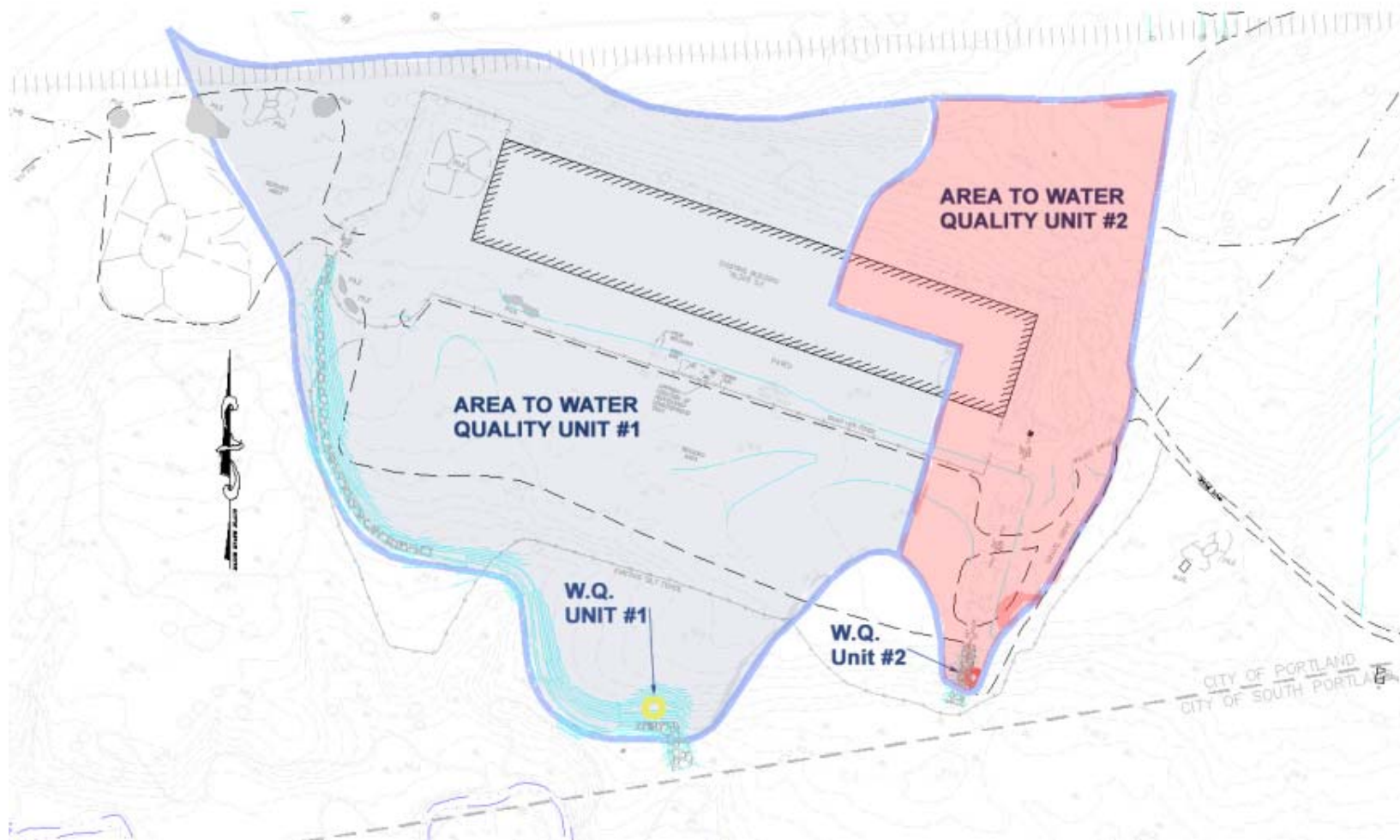
Airplane landing at PWM



FAA's "Hazardous Wildlife Attractants Near Airports"



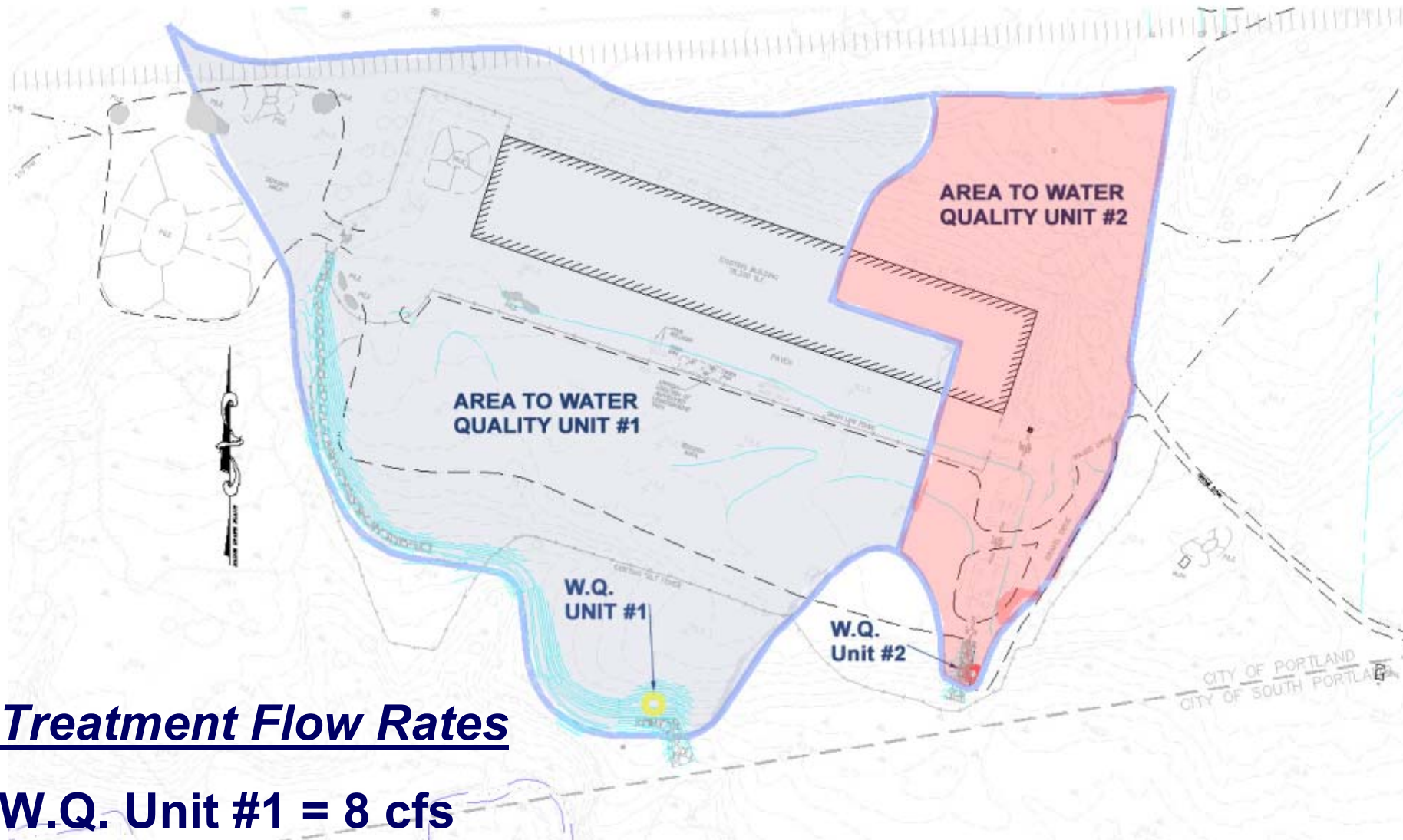
Water Quality with Hydrodynamic Vortex Separation



Maine DEP's Requirements for Manufactured systems

October 1, 2000

- Calculate required *treatment flow rate* as: peak runoff from a one year 24-hour storm
 - Size water quality units to provide
 - 80% U.S. Silica F-95 foundry sand for 50% TSS rating
 - 80% U.S. Silica OK-110 sand for 60% TSS rating
- at the *treatment flow rate*



Treatment Flow Rates

W.Q. Unit #1 = 8 cfs

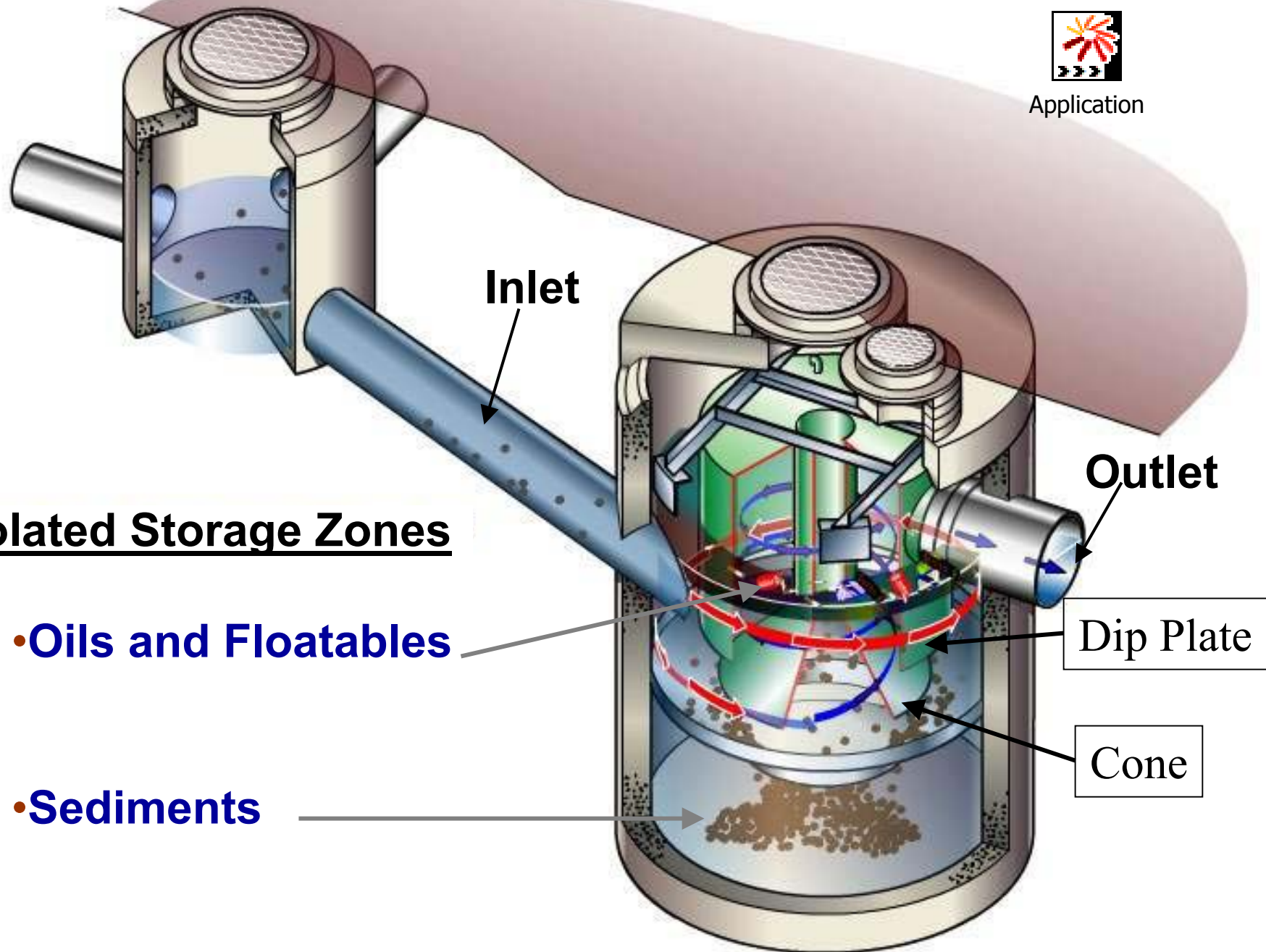
W.Q. Unit #2 = 4 cfs



Application

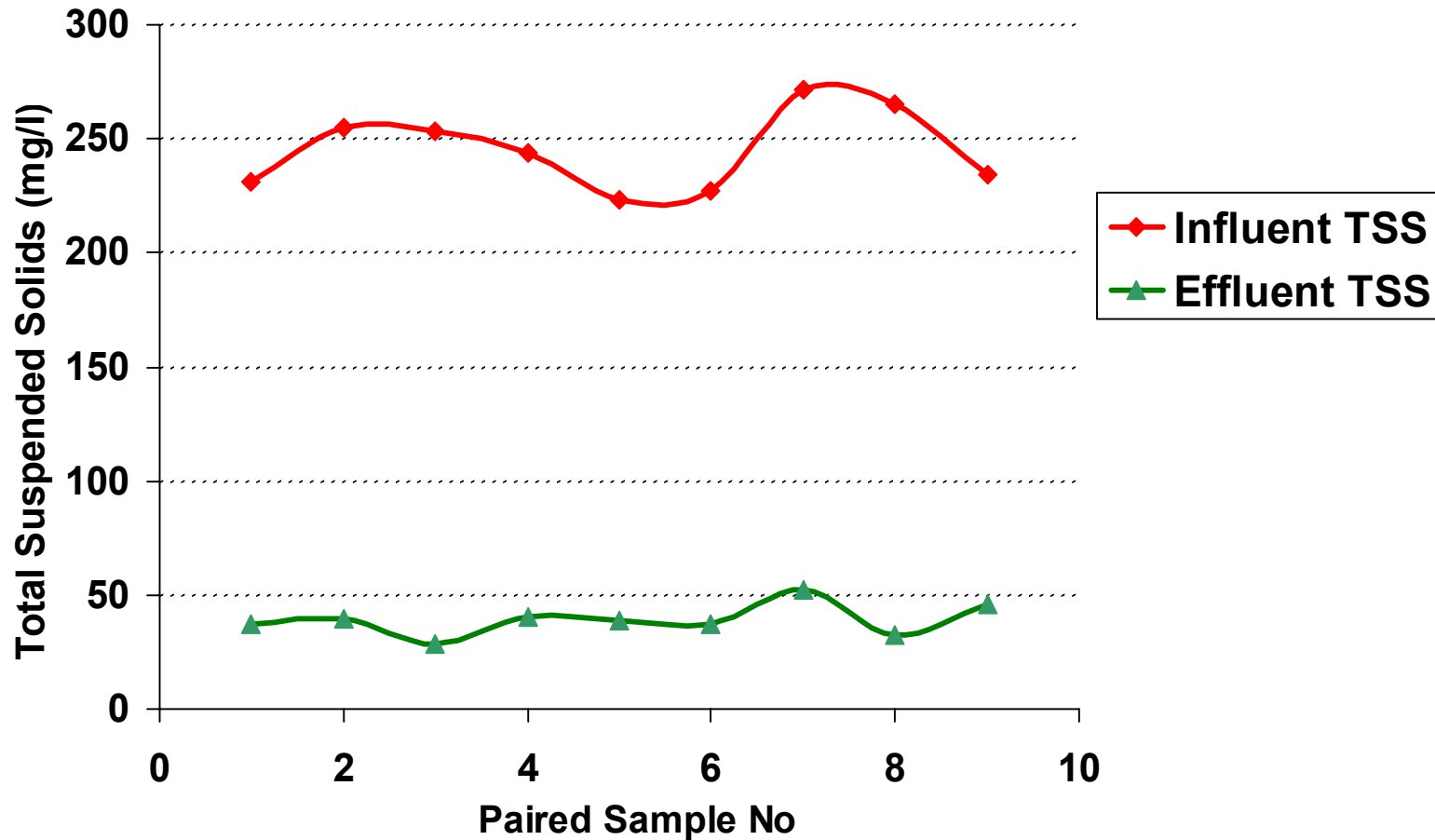
Isolated Storage Zones

- **Oils and Floatables**
- **Sediments**



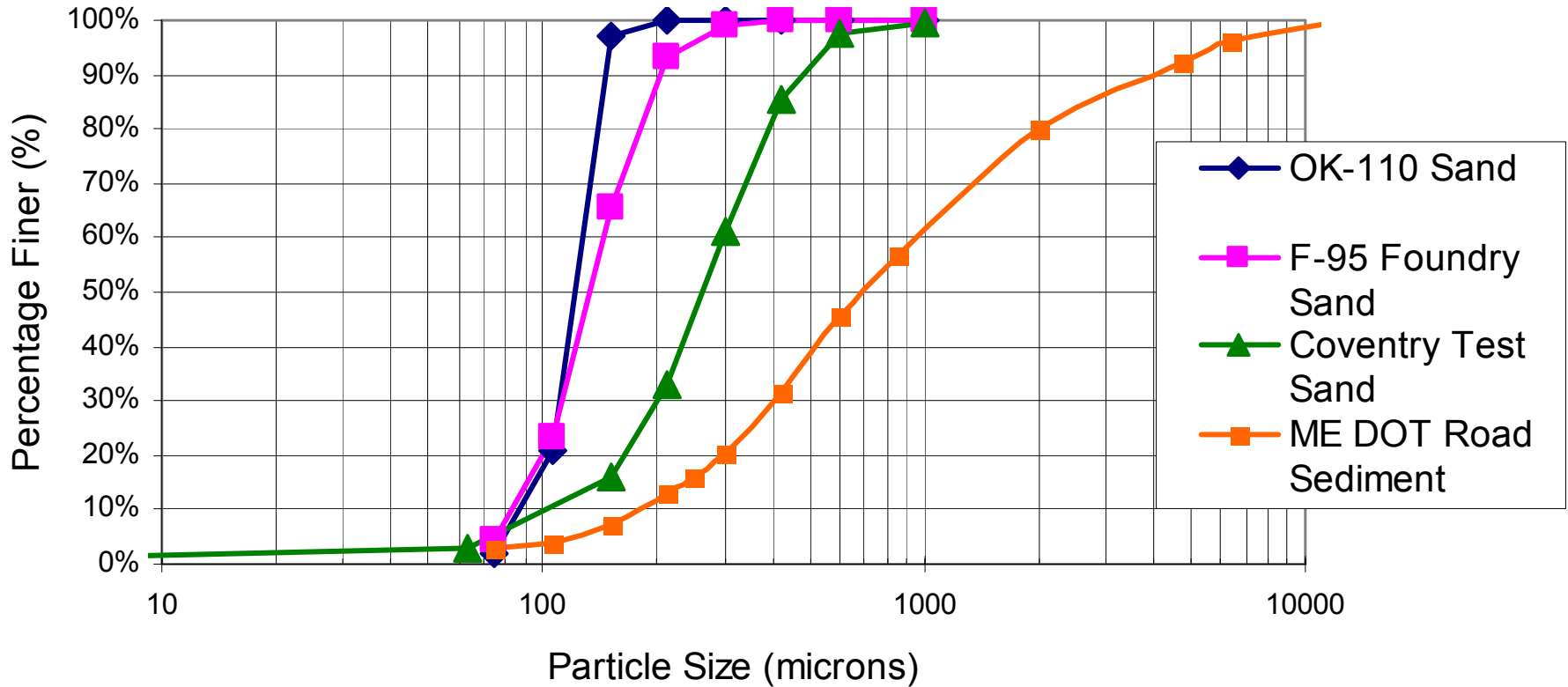
Maine DEP Testing

.. 4 ft Downstream Defender Unit ..



Particle Size Distributions

..Sediment Samples..



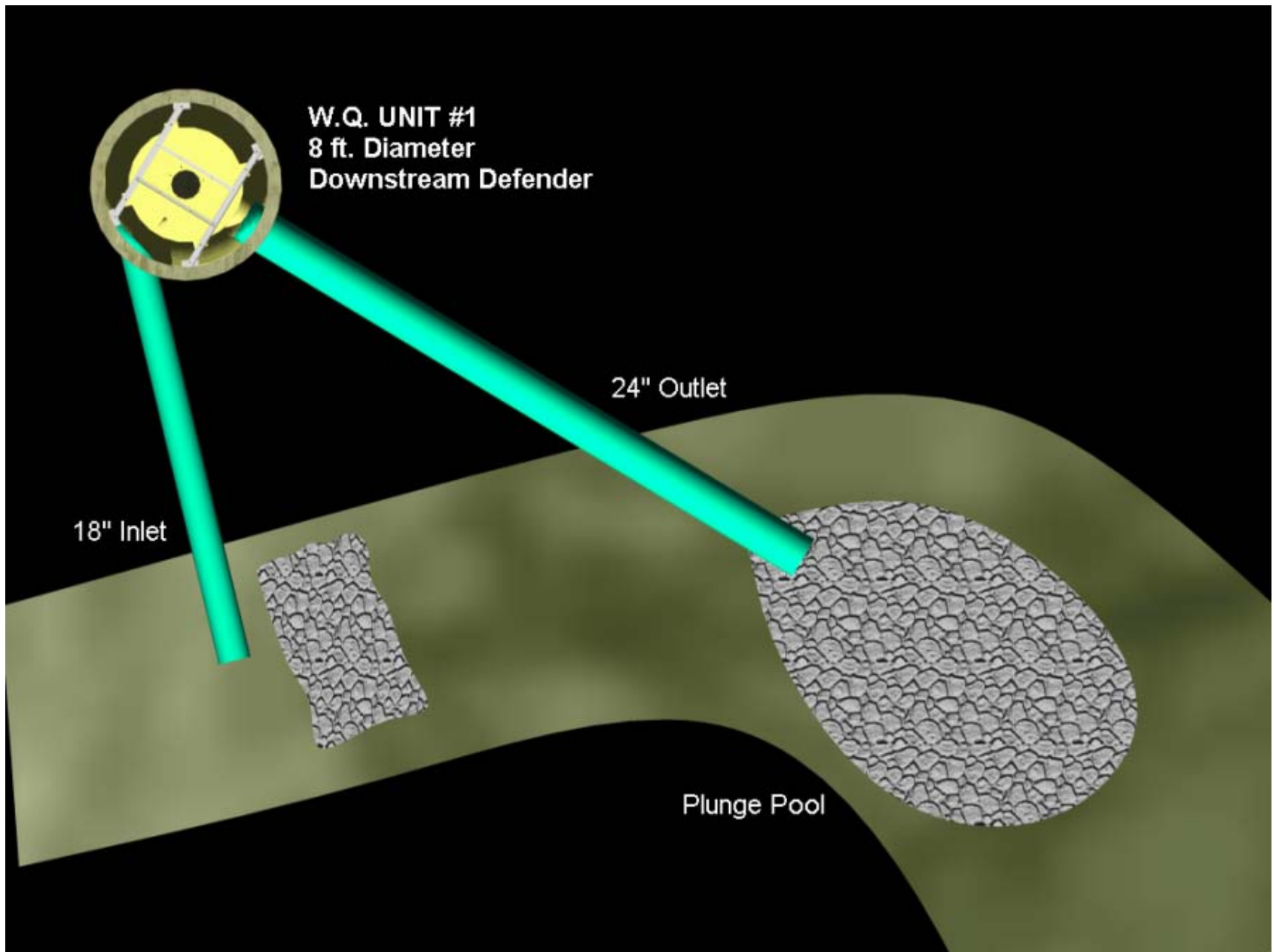
Maine DEP Approved Flows

$$Q_{1\text{ypf}} = 628 (D/4)^{2.5} \quad \longrightarrow \quad 50\% \text{ rating}$$

Where:

$Q_{1\text{ypf}}$ = the projected one year peak flow from the device's drainage area and
 D = the diameter in feet of the device's treatment chamber

Chamber Diameter (ft)	Max 1 yr Peak Flow (cfs)
2	0.7
4	1.4
6	4.0
8	8.0
10	14
12	15



8-ft diameter Downstream Defender





18-inch Inlet to 8-ft Downstream Defender

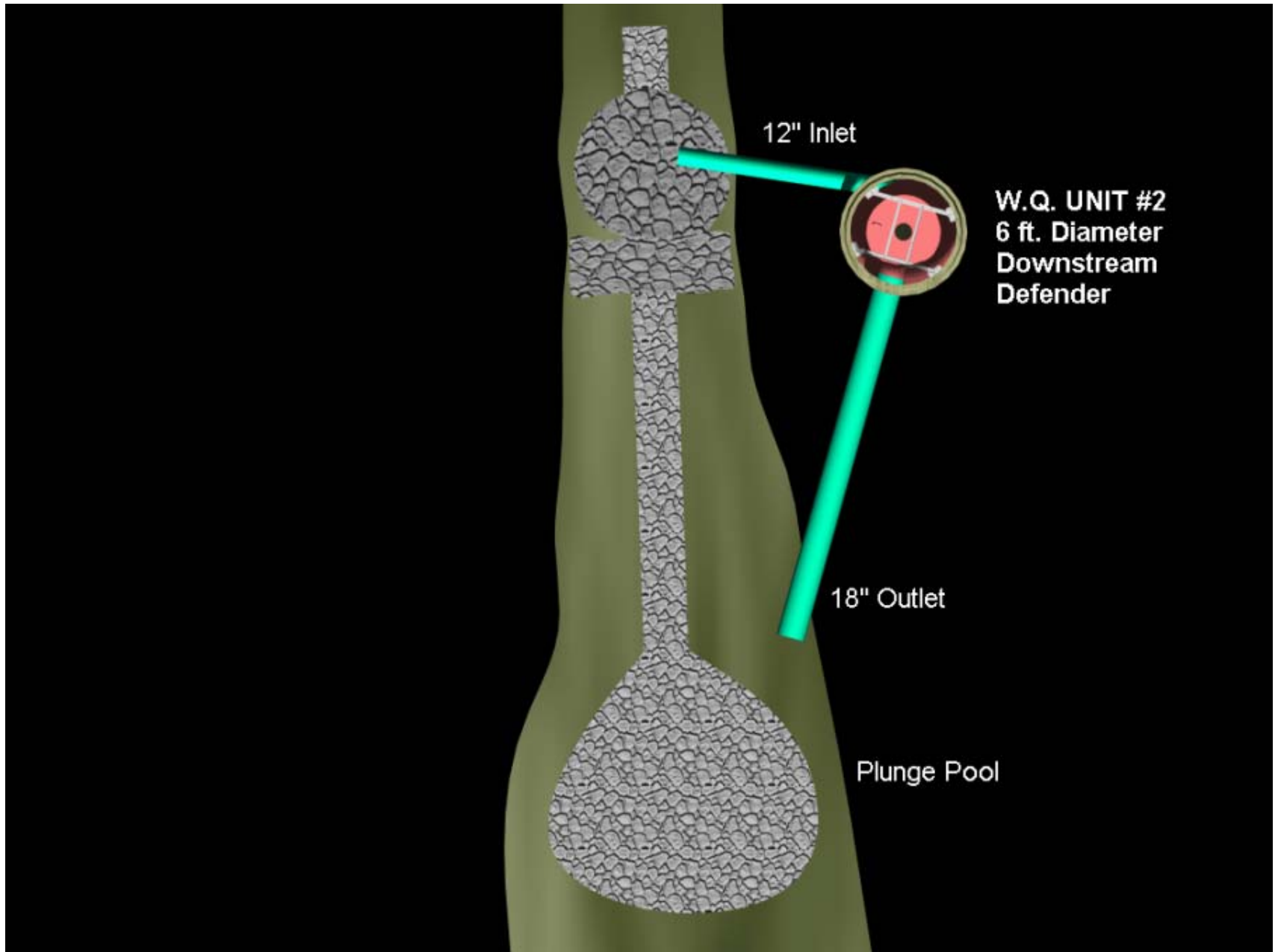


24-inch Outlet Pipe from 8-ft Downstream Defender



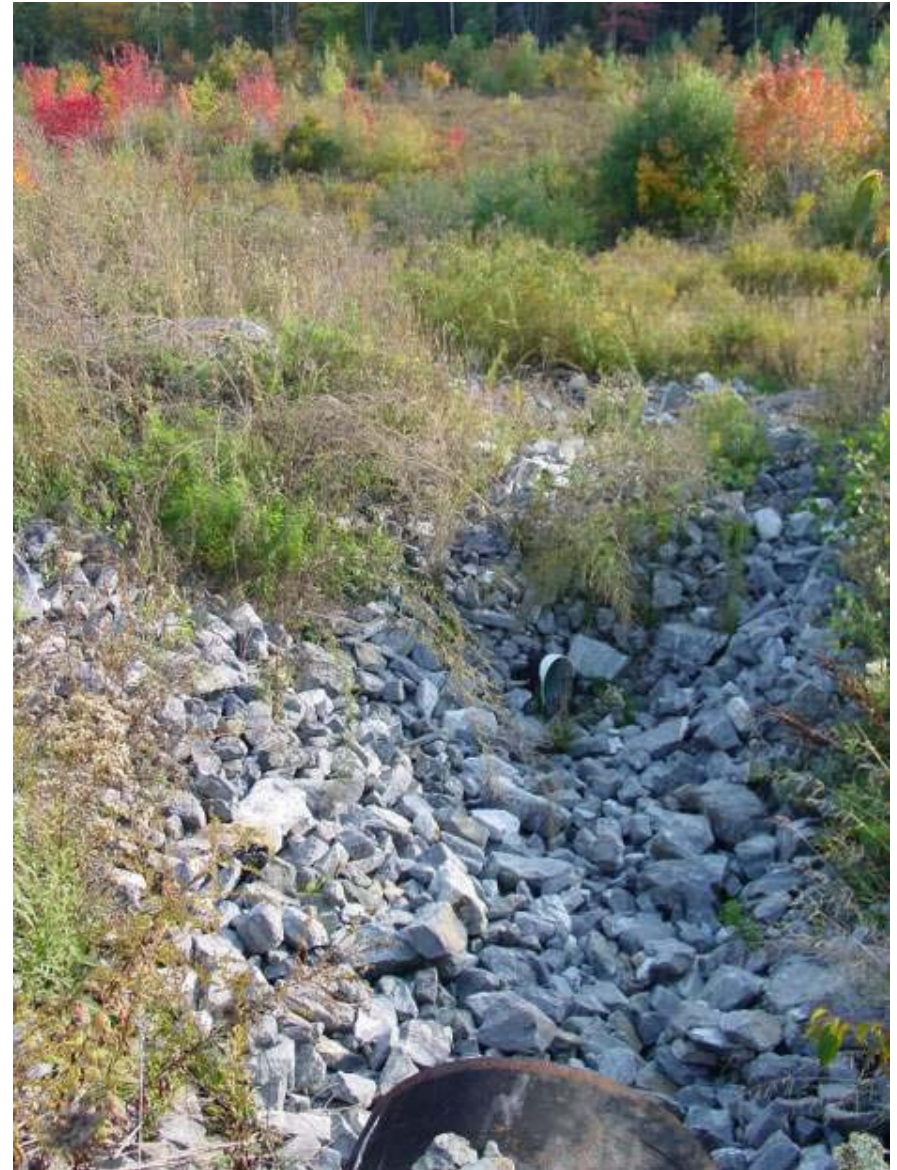
Looking upstream from 8-ft diameter Downstream Defender







12-inch Inlet to 6-ft Downstream Defender



18-inch Outlet Pipe from 6-ft Downstream Defender



Looking upstream from 6-ft diameter Downstream Defender



Trash and oil captured in 8-ft Downstream Defender





**Sediment
captured in
8-ft
Downstream
Defender**

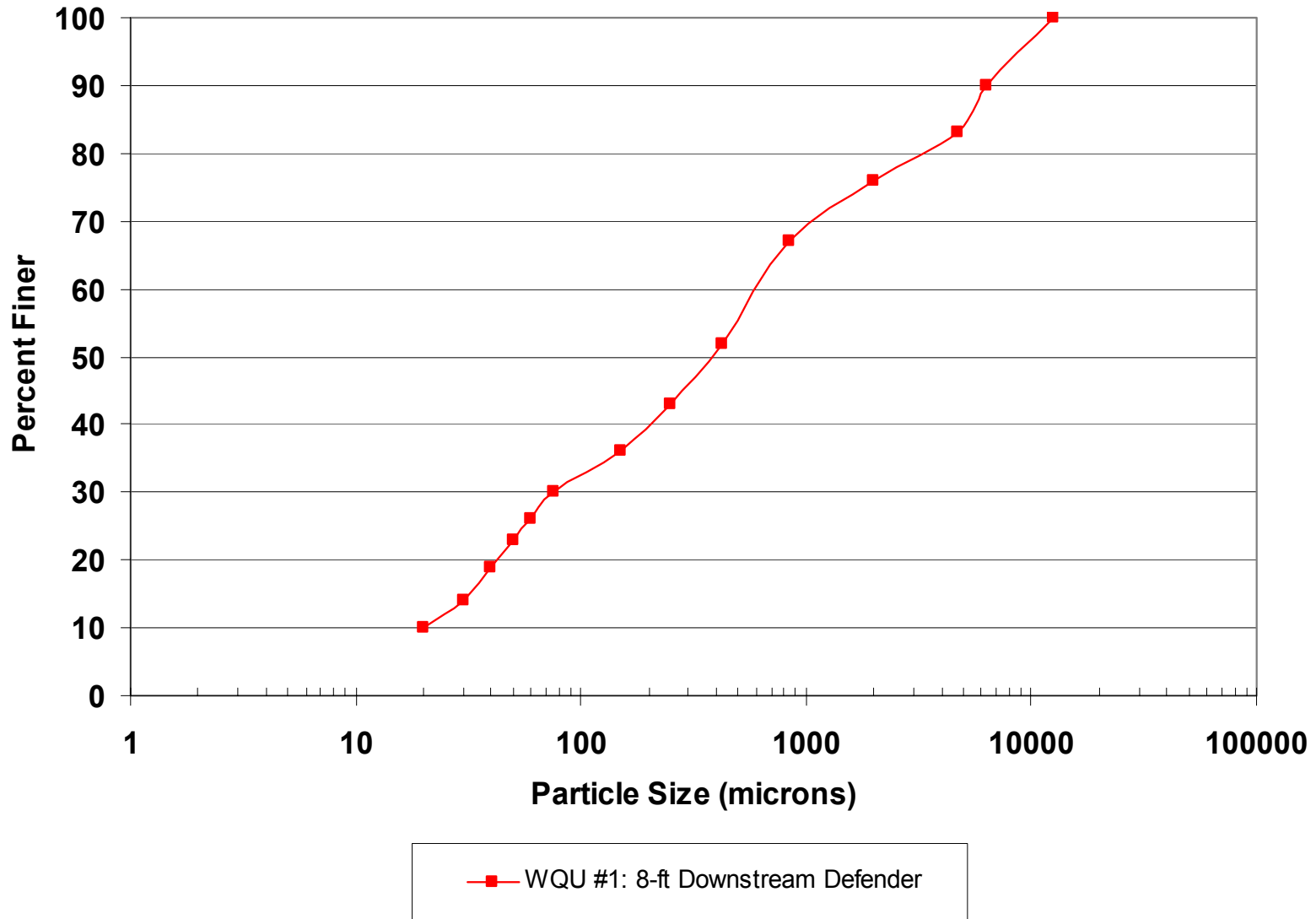
Oil and sediment captured in 6-ft Downstream Defender



Sediment Sampling



Snow Dump Particle Size Distribution



Sediment Analysis

WQU #1: 8-ft Downstream Defender



Report of Analytical Results

Client: Mark Johnston
Hydro International
94 Hutchins Drive
Portland, ME 04102

Lab Sample ID: WT2577-2
Report Date: 24-OCT-03
Client PO: 2032
Project: SNOW DUMP
SDG: WT2577

Sample Description

SD#8

Matrix

SL

Date Sampled

17-OCT-03

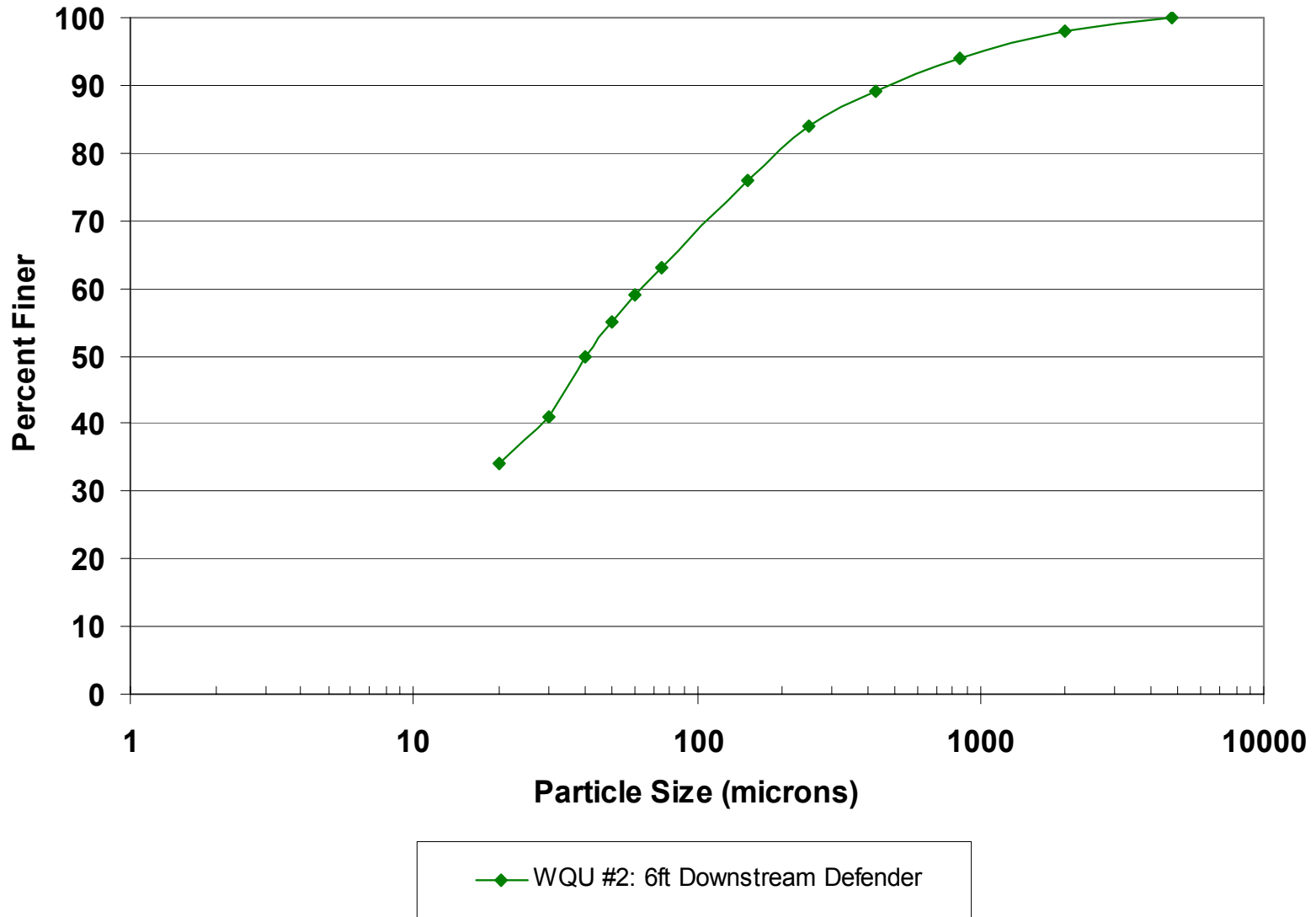
Date Received

21-OCT-03

Parameter	Result	Adj PQL	Anal. Method	QC.Batch	Anal. Date	By	Prep. Method	Prep. Date	By	Footnotes
Phosphorus, Total As P	620 mg/Kg	37	EPA 365.4	WG3961	22-OCT-03	PAG	EPA 365.4	21-OCT-03	PAG	
Total Solids	61 %	.1	CLP SOW 788	WG3999	23-OCT-03	PAG	CLP SOW 788	22-OCT-03	PAG	

Parameter	Result	Units	Adjusted PQL	Dilution Factor	PQL	Analytical Method	Analysis Date	By	Prep Method	Prepped Date	By	QC	Notes
ARSENIC	7.0	mg/Kg	0.8	1	0.8	SW846 6010	10/21/03	MJF	SW846 3050	10/21/03	JWM	TJ21ICS0	
BARIUM	44.3	mg/Kg	0.49	1	0.5	SW846 6010	10/21/03	MJF	SW846 3050	10/21/03	JWM	TJ21ICS0	
CADMIUM	U 1.00	mg/Kg	0.976	1	1	SW846 6010	10/21/03	MJF	SW846 3050	10/21/03	JWM	TJ21ICS0	
CHROMIUM	24.6	mg/Kg	1.46	1	1.5	SW846 6010	10/21/03	MJF	SW846 3050	10/21/03	JWM	TJ21ICS0	
COPPER	15.3	mg/Kg	2.4	1	2.5	SW846 6010	10/21/03	MJF	SW846 3050	10/21/03	JWM	TJ21ICS0	
LEAD	20.7	mg/Kg	0.5	1	0.5	SW846 6010	10/21/03	MJF	SW846 3050	10/21/03	JWM	TJ21ICS0	
MERCURY	0.072	ug/g	0.060	1	0.04	SW846 7471	10/23/03	MJF	7471	10/22/03	MJF	TJ22HGS0	
NICKEL	22.9	mg/Kg	3.90	1	4	SW846 6010	10/21/03	MJF	SW846 3050	10/21/03	JWM	TJ21ICS0	
SELENIUM	U 1.0	mg/Kg	0.98	1	1	SW846 6010	10/21/03	MJF	SW846 3050	10/21/03	JWM	TJ21ICS0	
SILVER	U 1.5	mg/Kg	1.5	1	1.5	SW846 6010	10/21/03	MJF	SW846 3050	10/21/03	JWM	TJ21ICS0	
ZINC	56.2	mg/Kg	2.44	1	2.5	SW846 6010	10/21/03	MJF	SW846 3050	10/21/03	JWM	TJ21ICS0	

Snow Dump Particle Size Distribution



Sediment Analysis

WQU #2: 6-ft Downstream Defender



Report of Analytical Results

Client: Mark Johnston
Hydro International
94 Hutchins Drive
Portland, ME 04102

Lab Sample ID: WT2577-1
Report Date: 24-OCT-03
Client PO: 2032
Project: SNOW DUMP
SDG: WT2577

Sample Description

SD#6

<u>Matrix</u>	<u>Date Sampled</u>	<u>Date Received</u>
SL	17-OCT-03	21-OCT-03

Parameter	Result	Adj PQL	Anal. Method	QC.Batch	Anal. Date	By	Prep. Method	Prep. Date	By	Footnotes
Phosphorus, Total As P	650 mg/Kg	44	EPA 365.4	WG3961	22-OCT-03	PAG	EPA 365.4	21-OCT-03	PAG	
Total Solids	56 %	.1	CLP SOW 788	WG3999	23-OCT-03	PAG	CLP SOW 788	22-OCT-03	PAG	

Parameter	Result	Units	Adjusted PQL	Dilution Factor	PQL	Analytical Method	Analysis Date	By	Prep Method	Prepped Date	By	QC	Notes
ARSENIC	12.	mg/Kg	1.	1	0.8	SW846 6010	10/21/03	MJF	SW846 3050	10/21/03	JWM	TJ21ICS0	
BARIUM	162.	mg/Kg	0.64	1	0.5	SW846 6010	10/21/03	MJF	SW846 3050	10/21/03	JWM	TJ21ICS0	
CADMIUM	U 1.28	mg/Kg	1.28	1	1	SW846 6010	10/21/03	MJF	SW846 3050	10/21/03	JWM	TJ21ICS0	1
CHROMIUM	53.4	mg/Kg	1.93	1	1.5	SW846 6010	10/21/03	MJF	SW846 3050	10/21/03	JWM	TJ21ICS0	
COPPER	26.4	mg/Kg	3.2	1	2.5	SW846 6010	10/21/03	MJF	SW846 3050	10/21/03	JWM	TJ21ICS0	
LEAD	22.2	mg/Kg	0.6	1	0.5	SW846 6010	10/21/03	MJF	SW846 3050	10/21/03	JWM	TJ21ICS0	
MERCURY	U 0.057	ug/g	0.057	1	0.04	SW846 7471	10/23/03	MJF	7471	10/22/03	MJF	TJ22HGS0	1
NICKEL	42.5	mg/Kg	5.14	1	4	SW846 6010	10/21/03	MJF	SW846 3050	10/21/03	JWM	TJ21ICS0	
SELENIUM	U 1.3	mg/Kg	1.3	1	1	SW846 6010	10/21/03	MJF	SW846 3050	10/21/03	JWM	TJ21ICS0	1
SILVER	U 1.9	mg/Kg	1.9	1	1.5	SW846 6010	10/21/03	MJF	SW846 3050	10/21/03	JWM	TJ21ICS0	1
ZINC	102.	mg/Kg	3.21	1	2.5	SW846 6010	10/21/03	MJF	SW846 3050	10/21/03	JWM	TJ21ICS0	

1 The laboratory's Practical Quantitation Level could not be achieved for this parameter due to sample composition, matrix effects, sample volume, or quantity used for analysis.

Portland, ME Snow Dump Benefits

- **Avoidance of large retention pond**
 - **eliminated FAA safety hazard**
 - **no unsightly trash and debris**
- **Protection of Clark Pond and Fore River**
- **Elimination of pollutants into Back Bay**



*Thank
You!*

**Dump trucks drop off
snow at the Portland
Snow Dump**

