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Blackburn & Union Privileges

Walpole, Massachusetts

CERCLIS #MAD982191363

Site Exposure Potential

Blackburn and Union Privileges, also known as Shaffer Realty Trust or South Street Site, is on 12 hectares in Walpole, Massachusetts on both sides of the Neponset River (Figure 1). The site and nearby lots have been used for commercial and industrial operations since the 1600s, when portions of the site were designated as water privileges to provide access to the Neponset River for water power. Several operations used hazardous substances at the site, including forging, tanning, and cotton-dye processing (inorganic substances); cotton bleaching and synthetic fabric manufacturing (acids and bases); tire and rubber manufacturing (SVOCs); and asbestos products manufacturing (U.S. EPA 1991).

The site is located within the Neponset River drainage basin. The Neponset River flows through the site and discharges to Dorchester Bay and the Atlantic Ocean 36 km downstream of the site.

Groundwater 1 to 9 m beneath the site in the unconsolidated deposits of the School Meadow Brook aquifer/Mine Brook aquifer system flows from east to west, discharging to the Neponset River. The aquifers were named for the tributaries of the Neponset River with which they are "associated" (the nature of this association was not clarified in the available site documentation; NUS 1991).

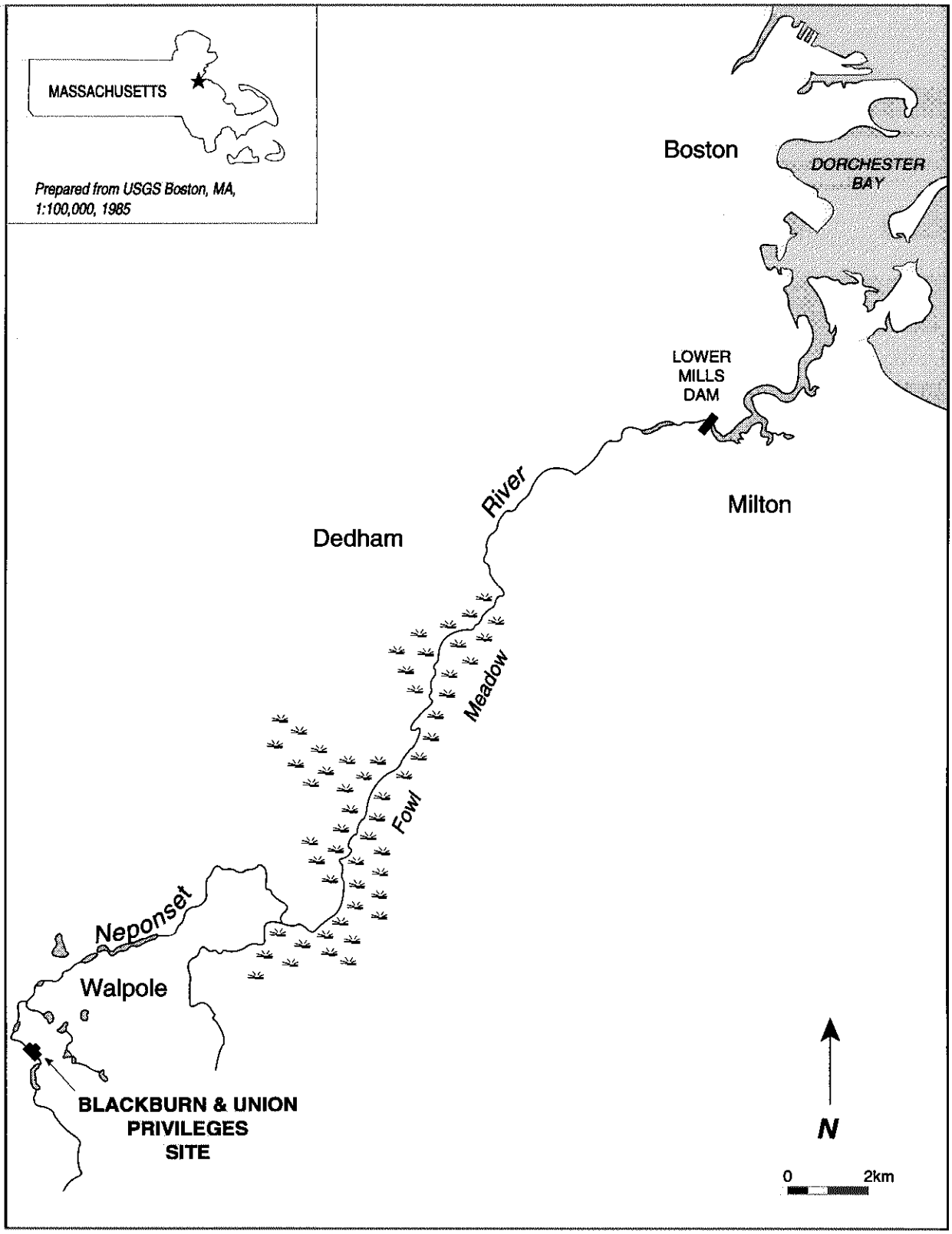

Figure 1. Blackburn & Union Privileges, Walpole, Massachusetts.

Potential pathways of contaminant transport from the site to trust habitats and species include surface runoff, groundwater discharge, and erosion of contaminated soils adjacent to the river. A millrace that formerly diverted water to the site is also a potential pathway for runoff from the site to the Neponset River. There is standing water in the remains of the tail race during periods of high precipitation (NUS 1991). Site-related contaminants have been observed in the Neponset River 3.2 km downstream of the site (U.S. EPA 1991).

NOAA Trust Habitats and Species

The main habitats of concern to NOAA are surface water and associated bottom substrates of the lower Neponset River. Secondary habitats of concern are the upper Neponset River near the site and tidal water and associated bottom habitats of Dorchester Bay. Tidal influence in the Neponset River extends to the Lower Mills Dam in Milton, 30 km downstream of the site. The dam (4 m high and 25 m wide) is not equipped with fish passage facilities and prevents trust species other than American eel from accessing the site. There are currently no plans for restoration (Chase personal communication 1992).

A diverse population of anadromous, estuarine, and invertebrate species use the lower reaches of the Neponset River below the Lower Mills Dam and the intertidal portions of Dorchester Bay (Table 1; Chadwick personal communication 1992; Chase personal communication 1992). Blueback herring and rainbow smelt use the lower saline reaches of the Neponset River and the marine habitat of Dorchester Bay as a spawning, nursery, forage, and migratory area. Blueback herring commonly congregate immediately downstream of the Lower Mills Dam. Dorchester Bay also provides habitat for American lobster and soft shell clam (Chase personal communication 1992).

Surface water of the Neponset River near the site provide a temperate, freshwater aquatic habitat. There are sizable wetlands along the river banks. Fowl Meadow, a valued wetlands habitat for waterfowl and freshwater fish, is approximately 16 km downgradient from the site. There are no known threatened or endangered species in the Neponset River Basin (Bergen personal communication 1992).

There is no commercial fishing in the Neponset River estuary or tidal flat areas at the mouth of the river. Lobster is the only commercial fishery of note in Dorchester Bay, but is not regarded as large scale (Chase personal communication 1992). In the past, there has been limited commercial harvesting of soft shell clams in Dorchester Bay. However, due to bacterial contamination, recent shellfish harvests have failed to meet the state health requirements (Chadwick personal communication 1992).

Table 1. NOAA trust species, habitat use, and commercial and recreational fisheries in the Neponset River below Lower Mills Dam and in the intertidal water of Dorchester Bay.

Species		Habitat Use			Fisheries	
Common Name	Scientific Name	Spawning Ground	Nursery Ground	Adult Forage	Commercial	Recreational
ANADROMOUS/CATADROMOUS SPECIES						
Blueback herring	*Alosa aestivalis*	♦	♦	♦		♦
Alewife	*Alosa pseudoharengus*			♦		♦
American eel	*Anguilla rostrata*			♦		
Striped bass	*Morone saxatilis*			♦		♦
Rainbow smelt	*Osmerus mordax*	♦	♦	♦		♦
ESTUARINE FISH						
Atlantic menhaden	*Brevoortia tyrannus*		♦	♦	♦	♦
Atlantic herring[1]	*Clupea harengus*	♦	♦	♦		
Mummichog	*Fundulus heteroclitus*	♦	♦	♦		
Atlantic cod	*Gadus morhua*			♦		
Atlantic silverside	*Menidia menidia*	♦	♦	♦		
Grubby	*Myoxocephalus aenaeus*			♦		
Winter flounder	*Pseudopleuronectes americanus*			♦		♦
Skate	*Raja eglateria*			♦		
Bluefish	*Pomatomus saltatrix*		♦	♦		♦
Windowpane [1]	*Scopthalmus aquosus*		♦	♦		
Pipefish [1]	*Syngnathus fuscus*	♦	♦	♦		
Cunner	*Tautogolabrus adspersus*		♦	♦		
INVERTEBRATES						
American lobster	*Homarus americanus*		♦	♦	♦	
Soft shell clam	*Mya arenaria*	♦	♦	♦	♦	

[1] Species considered likely to occur in the region.

Site-Related Contamination

In 1989, a variety of hazardous substances including VOCs, SVOCs, inorganic substances, and asbestos, were detected in on-site soil, sediment, and groundwater samples collected during site assessment investigations. Two sources of contamination were identified: contaminated soil and the lagoon system. The lagoon system includes two former lagoons used as settling ponds during cotton bleaching operations and a mixing area where waste liquids were pH-adjusted before being discharged to the lagoons (U.S. EPA 1991).

A total of 754 shallow and deep soil samples were collected: 710 samples were analyzed for asbestos and 44 samples were analyzed for TCL parameters (VOCs, SVOCs, and inorganics). A variety of VOCs, SVOCs, and inorganic substances were detected in on-site soils (Table 2; HRS 1991).

Asbestos was detected in both shallow and deep soils at concentrations ranging from not detected (detection limit not provided) to 80% asbestos by weight (U.S. EPA 1991).

Several VOCs, SVOCs, inorganic substances, and asbestos have been detected in groundwater samples collected from 13 on-site wells at concentrations exceeding background concentrations (Table 3; HRS 1991). The concentrations of lead and mercury in on-site groundwater exceeded their respective chronic AWQC (U.S. EPA 1986) by more than a factor of ten. Mercury was also measured in "background" groundwater at a concentration exceeding its AWQC by ten times. However, information on where the "background" groundwater samples were collected was not available. It is possible that these groundwater samples may not have been representative of actual background concentrations.

Several SVOC and inorganic substances were detected in sediment samples collected from the lagoon and mixing area at concentrations exceeding levels shown to cause adverse biological

Table 2. Maximum concentrations (mg/kg) of selected contaminants detected in on-site soil and sediment from the former lagoon system.

Contaminant	On-site Soil	Average U.S. Soil[1]	Lagoon Sediment	ER-L[2]
INORGANIC SUBSTANCES				
Trace Elements				
Antimony	160	1	NA	2
Arsenic	52	5	54	33
Cadmium	21	0.06	22	5
Chromium	506	100	2,500	80
Copper	17,000	30	6,900	70
Cyanide	36	N/D	NA	N/D
Lead	51,000	10	500	35
Mercury	22	0.03	16	0.15
Nickel	450	40	190	30
Zinc	56,000	50	1800	120
ORGANIC COMPOUNDS				
Volatile organic compounds				
Ethylbenzene	2.4	N/D	NA	N/D
Trichloroethene	0.6	N/D	NA	N/D
Xylene	3.8	N/D	NA	N/D
Semivolatile organic compounds				
Anthracene	60	N/D	0.97	0.085
Benzo(a)pyrene	49	N/D	4	0.40
Fluoranthene	150	N/D	5.3	0.60
Naphthalene	43	N/D	0.64	0.34
Phenanthrene	220	N/D	5.4	0.225
Pyrene	120	N/D	8.2	0.35

NA: Not analyzed.
N/D: Not determined.
ND: Not Detected; detection limt not provided.
1: Lindsay (1979).
2: Effects range-low; the concentration representing the lowest 10 percentile value for the data in which effects were observed or predicted in studies compiled by Long and Morgan (1990).

Table 3. Maximum concentrations (µg/l) of selected contaminants detected in on-site groundwater.

Contaminant	Groundwater Background	Groundwater On-site	Chronic AWQC[1]
INORGANIC SUBSTANCES			
Trace Elements			
Arsenic	2	257	190
Copper	6	36	12+
Lead	2	599	3.2+
Mercury	0.2	1.4	0.012
Nickel	15	466	160+
ORGANIC COMPOUNDS			
Volatile			
1,2 Dichloroethene	<5	16	N/D
Styrene	<5	1,100	N/D
Toluene	<5	3,200	5,000
Xylenes (total)	<5	17	N/D
Semivolatile			
Acenaphthene	<10	22	520*
Acenaphthylene	<10	550	N/D
Fluorene	<10	27	N/D
Naphthalene	<10	9,900	620*
Phenanthrene	<10	47	2,560*
Pyrene	<10	13	N/D

1 Ambient water quality criteria for the protection of aquatic organisms. Freshwater chronic criteria presented (EPA 1986).
+ Hardness-dependent criteria (100 mg/l $CaCO_3$ used).
N/D: Not determined.
* Insufficient data to develp criteria; value presented is Lowest Observed Effects Level.
<: Not detected at method detection limit.

effects in other studies (Table 2; Long and Morgan 1990; HRS 1991). Inorganic substances were highest in sediments from the mixing area. SVOCs were highest in sediments from the lagoon. Asbestos has been observed along the banks of the Neponset River and in river sediments 3 km downstream of the site (NUS 1991).

Summary

The Lower Neponset River and Dorchester Bay support a diverse population of anadromous, estuarine, and invertebrate species. NOAA resources, except for American eel, cannot reach the site due to the Lower Mills Dam in Milton, 30 km downstream of the site. Contaminants of potential concern to NOAA if anadromous fish runs are restored include chromium, copper, lead, mercury, nickel, and zinc.

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