

## Glossary

**aquifer:** an underground geological formation, containing usable amounts of groundwater that can supply wells and springs.

**concentration:** the relative amount of a substance mixed with another substance such as water, air, or soil.

**contaminants:** substances that pollute the air, water, soil, or food.

**maximum contaminant levels (MCLs):** the maximum concentration of a given contaminant allowed in a public drinking water supply under state and federal regulations. **MMCLs** refer to Massachusetts Maximum Contaminant Levels.

**groundwater plume:** a volume of contaminated groundwater that extends away from the original source of contamination. The size and shape of a groundwater plume is confirmed by multiple samples from multiple wells above a maximum contaminant level or health advisory.

**health advisory:** U.S. EPA guidelines representing the concentration of a contaminant in drinking water that, given a lifetime of exposure, is not expected to cause adverse, non-cancerous, effects.

**parts per billion (ppb):** measure of concentration of contaminants, which for water is equivalent to micrograms per liter.

**water table:** the upper limit of the sandy soil completely saturated with water.

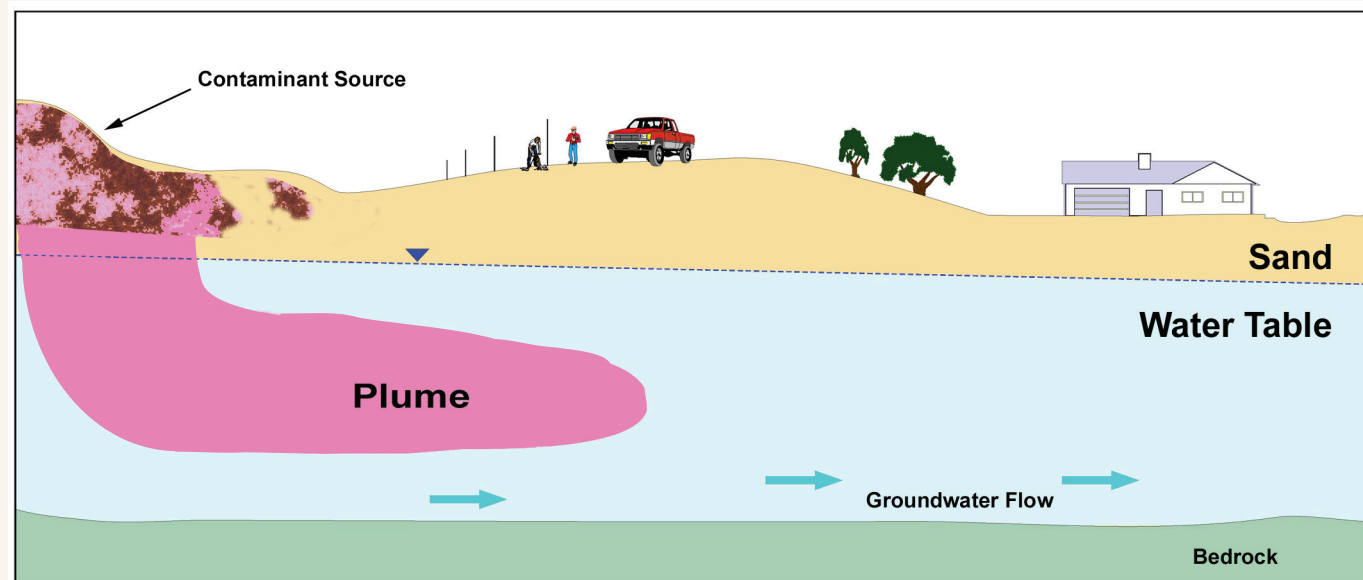


Figure 1

### Agency Contacts

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U.S. EPA: Jim Murphy, 617-918-1028; [murphy.jim@epa.gov](mailto:murphy.jim@epa.gov)

MassDEP: Ellie Grillo, 508-946-2866; [ellie.grillo@state.ma.us](mailto:ellie.grillo@state.ma.us)

### Information Repositories

Information on contamination, cleanup activities, environmental programs, public involvement activities and public health related information is available at the MMR Information Repositories located at public libraries in Bourne, Falmouth, and Sandwich. Documents submitted for public comment are also available at the repositories.

## Massachusetts Military Reservation GROUNDWATER FINDINGS MAP

December 2008

The Groundwater Findings Map shows known areas of groundwater contamination related to the Massachusetts Military Reservation (MMR) that are above a state or federal **maximum contaminant level, health advisory**, or risk-based concentration. (Words in bold type are in the glossary.)

The MMR is located on the upper western portion of Cape Cod and sits over the recharge area for a sole source **aquifer** that serves as a source of drinking water for Bourne, Falmouth, Mashpee and Sandwich.

Due to Cape Cod's sandy soil, **contaminants** deposited on the surface can mix with rainwater, dissolve, and move down to the aquifer. The dissolved contamination then moves with the groundwater at an average rate of 1 to 2 feet per day. If contamination levels in the groundwater exceed drinking water standards or advisory levels a **groundwater plume** may be created (See Figure 1). A number of these plumes have been identified both on and off MMR. None of these areas of groundwater contamination are currently impacting public or private drinking water supplies. The contamination is being addressed to ensure drinking water supplies are not impacted in the future.

The Air Force Center for Engineering and the Environment's (AFCEE) Installation Restoration Program (IRP), and the Army Environmental Command's Impact Area Groundwater Study Program (IAGWSP) are working with the U.S. Environmental Protection Agency (U.S. EPA), the Massachusetts Department of Environmental Protection (MassDEP) and the community to investigate and clean up groundwater contamination on and emanating from the MMR and its sources.

### IRP

The IRP has defined 12 groundwater plumes, 11 plumes have treatment, one Chemical Spill 19 (CS-19) is monitored, and two areas of groundwater are monitored that do not meet the definition of a plume. IRP plumes include CS-19 and plumes shown on the Groundwater Findings Map in yellow and green. All IRP plumes except CS-19 have moved beyond the MMR boundary and are in various stages of cleanup and monitoring. For more information visit [www.mmr.org](http://www.mmr.org) or see the contact information on the back page.

### IAGWSP

The IAGWSP has identified nine sites on the northern 15,000 acres of MMR with areas of groundwater contamination. These include the Central Impact Area, Demolition Area 1, Demolition Area 2, the Northwest Corner, the Western Boundary and the Southeast Ranges, which include the J-1, J-2, J-3 and L ranges. The plumes related to these sites are shown in tan and pink on the Groundwater Findings Map. Groundwater treatment systems, as indicated on the map, are in place or planned to address the five plumes with the highest levels of contamination--Demolition Area 1, J-2 North, J-2 East, J-3 and J-1 South.

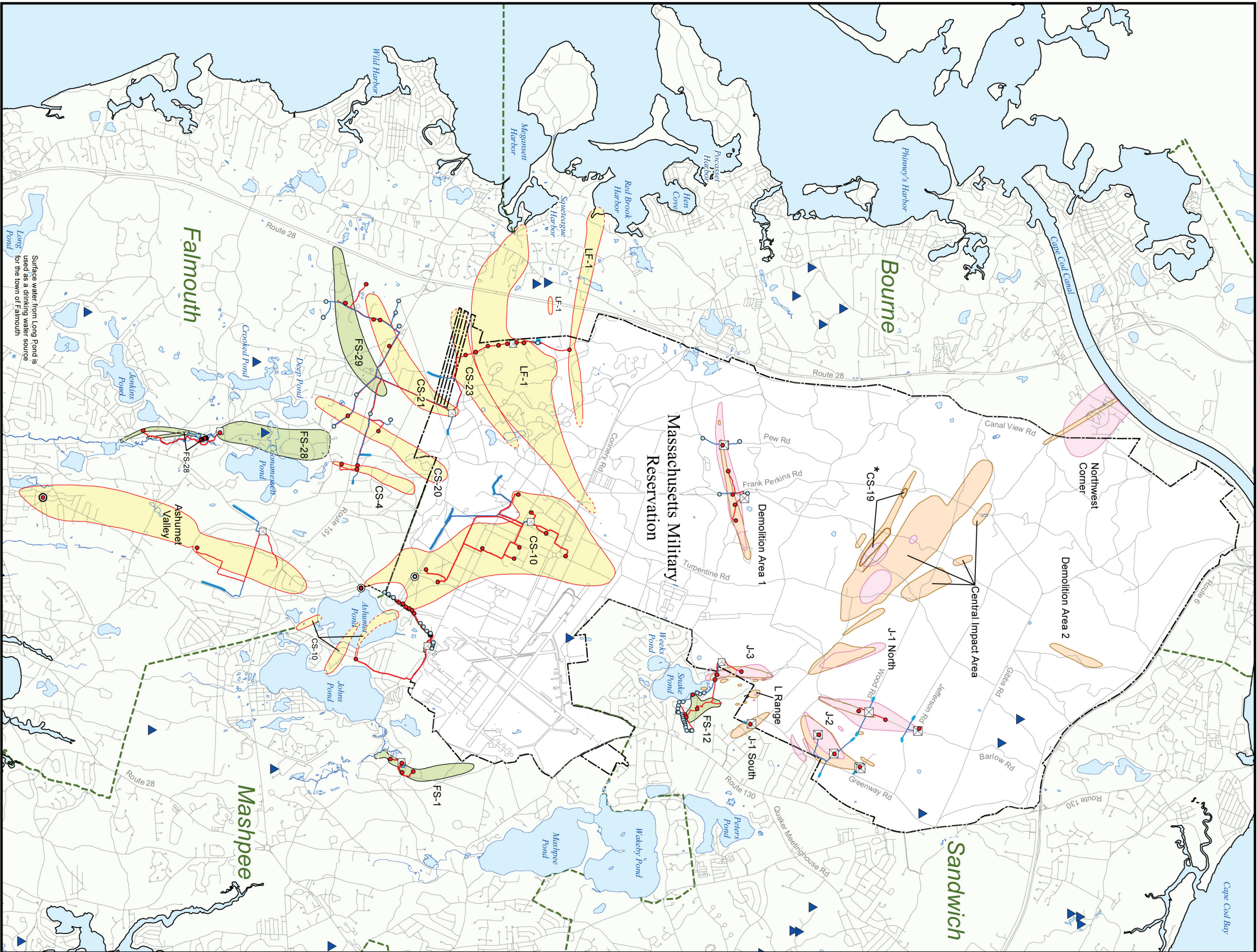
With investigations of known areas of groundwater contamination completed, the IAGWSP is in the process of determining the need for and selecting long-term cleanup actions for the remaining plumes. Investigations into other potential source areas are ongoing.

For more information visit [groundwaterprogram.army.mil](http://groundwaterprogram.army.mil) or see the contact information at the back page.



This booklet is produced by the Massachusetts National Guard Environmental & Readiness Center in coordination with the IRP, the IAGWSP, the U.S. EPA and MassDEP.





Surface water from Long Pond is used as a drinking water source for the town of Falmouth

## Massachusetts Military Reservation Groundwater Findings Issued November 2008

MCL - Maximum Contaminant Level for drinking water

MMCL - Massachusetts MCL

ppb - parts per billion

TCE - Trichloroethene - a solvent

PCE - Tetrachloroethene - a solvent

EDB - Ethylene Dibromide - a fuel additive

RDX - Royal Demolition Explosive - an explosive compound

Perchlorate - A salt used as an oxidizer

GW-1 Standard - A default cleanup value established by the state under the Massachusetts Contingency Plan to be used in lieu of a site-specific risk-based value.

I RP plumes are named for source areas, abbreviated as follows:

FS = Fuel Spill

CS = Chemical Spill

LF = Landfill

- Chlorinated Solvents Plume - Concentrations Exceed MCLs TCE = 5.0 ppb PCE = 5.0 ppb
- EDB Plume - Concentrations Exceed MMCL = 0.02 ppb
- Perchlorate Plume - Concentrations Exceed MMCL = 2.0 ppb
- RDX Plume - Concentrations exceed EPA risk-based level = 0.6 ppb. \* The CS-19 RDX plume is defined by the GW-1 standard of 1 ppb.

- Extraction Well
- Extraction Well Under Construction
- Reinjection Well
- Reinjection Well Under Construction
- Treatment Plant
- Municipal Water Supply Well
- Town Boundary
- Initiation Trench/Gallery

- Treatment System Pipeline:
  - Influent
  - Effluent
  - Proposed



Scale: 1 inch = 1 mile



Plume boundaries shown are as of October 2008  
The areas of contamination show the combined contaminants of concern within each plume.