

Green Remediation Focus

Minimizing the environmental footprint of site cleanup

A Profile in Using Green Remediation Strategies

Additional profiles available at clu-in.org/greenremediation/profiles

*Solvents Recovery Service of New England,
Inc. Superfund Site
Southington, Connecticut*

Superfund NPL

Cleanup Objectives: Remediate soil, sediment and groundwater contaminated by past use of this 42-acre site for reprocessing and reclaiming spent solvents and petroleum fuels. Contaminants include volatile organic compounds (VOCs), dense non-aqueous phase liquid and per- and polyfluoroalkyl substances (PFAS). Remedial actions have involved removing waste drums, conducting in situ thermal remediation (ISTR) to address soil contaminants, operating a groundwater pump-and-treat (P&T) system to prevent contaminant migration, and consolidating and capping contaminated soil, wetland soil and river sediment. The site borders the Quinnipiac River, which flows to Long Island Sound.

Green Remediation Strategy: The strategy focused on designing and constructing remedies with site reuse considerations to maximize long-term efficiencies of using material, energy and other natural resources. Primary best management practices (BMPs) integrated into the remedy design and construction included:

- Use onsite sources of renewable energy to power remediation equipment or offset the use of grid-supplied power for remediation purposes.
- Integrate green infrastructure elements as a nature-based approach to retaining or diverting stormwater.
- Develop a site restoration plan that uses a suitable mix of non-invasive native trees, shrubs, grasses and forbs to preserve or improve biodiversity and related ecosystem services and minimize long-term maintenance of vegetation.

Results:

- Reduced the areal footprint of contaminated soil and sediment capping and associated cap maintenance by excavating and consolidating the material in a single area rather than multiple smaller areas. This remedy modification also facilitated reuse of the capped area. While the majority of the 2.9-acre multilayer cap's surface consists of a vegetated layer, approximately 525 linear feet of the cap surface was paved instead of seeded for recreational purposes and a 65- by 260-foot area was topped with 6 inches of crushed stone instead of seeded to provide a base for renewable energy equipment.
- Avoided use of an average of 70,890 kilowatt-hours of grid electricity each year through the operation of a 53 kilowatt photovoltaic (PV) array installed above the consolidated soil/sediment cap and connected to the utility grid. The solar energy system directly supplies power to operate the groundwater extraction pumps as well as the groundwater treatment building. Excess power generated by the PV array is fed to the utility grid for electricity purchase credits, which are applied on cloudy days when the solar array cannot meet the full energy demand and grid-supplied electricity is therefore required to continue operations at the required rate.
- Eliminated the onsite environmental footprint of treating the extracted groundwater by transitioning to offsite treatment of the groundwater after 10 years of P&T operations involving metals pretreatment, filtration, ultraviolet oxidation and granular activated carbon adsorption. A review of the influent data concluded that contaminant concentrations in the groundwater had been reduced to levels below the state and local thresholds for permitted discharge to the publicly owned treatment works. Groundwater continues to be extracted from a series of four extraction wells extending to the overburden aquifer or bedrock aquifer but is now discharged to the town of Southington sanitary sewer. Suspending onsite treatment of the extracted groundwater is estimated to annually save approximately \$400,000.

- Created a 10-foot wide pedestrian and bicycle path made of asphalt to facilitate reuse of a former railroad right-of-way crossing the completed onsite cap. Companies performing the cleanup collaborated with the U.S. Environmental Protection Agency, Connecticut Department of Energy and Environmental Protection (DEEP) and town of Southington to connect the path with the regional Farmington Canal Heritage Trail.
- Reduced stormwater runoff by approximately 5% when compared to pre-remediation site conditions by converting impervious surfaces to vegetated surfaces. Additional runoff is retained for onsite infiltration via vegetated swales installed along the cap perimeter and the paved recreational path. Also, a level spreader and vegetated filter strip installed on the downgradient side of an onsite parking lot filters the parking lot runoff and prevents associated erosion.
- Gained approximately 1,600 cubic feet of sitewide flood storage capacity by leaving an excavation unfilled and thus provide an infiltration gallery. The excavated area had provided grading material for remedy construction.
- Restored target plant species to enhance biodiversity and provide habitat for wildlife. As part of soil/sediment cap construction, approximately 600 native wetland trees and shrubs were installed in remediated wetlands and approximately 2,100 native trees and shrubs were installed in disturbed upland areas. Four years after the plantings, survival rates of the planted target trees and shrubs were estimated at approximately 70% and 80%, respectfully. Additional shrubs may be planted in the future to achieve additional habitat restoration. This effort is part of a habitat restoration project undertaken by the U.S. Fish and Wildlife Service and Connecticut DEEP. Co-benefits are anticipated to include alleviation of flooding along banks of the Quinnipiac River.

Property End Use: Open space

Points of Contact: [Kevin Heine](#), U.S. Environmental Protection Agency Region 1; and [Shannon Pociu](#), Connecticut Department of Energy and Environmental Protection



Solar System Aerial View: The solar energy system includes 156 340-watt PV modules covering approximately 0.4 acres. During cap construction, a piping conduit was installed above the cap's geosynthetic layer to hold wiring extending from the array to the former groundwater treatment building, which now houses the system's inverter, controls, connections to the utility grid, and other auxiliary equipment. The cap was completed in 2017 and the solar energy system was constructed and began operating the following year.



Solar Array: The array was installed as a ground-mounted system whereby the PV panels and racks were placed aboveground and anchored with ballast weights rather than driven posts. With a weight of approximately 3-7 pounds per square foot, the solar array is anticipated to pose minimal strain on the geosynthetic membrane of the soil/sediment cap over its designed lifespan. A lifespan of 20-30 years is anticipated for the solar energy system. Routine inspections have indicated no signs of erosion near the array or of differential cap settlement due to the solar panels or their underlying gravel pad.



ISTR Operation: Thermal remediation was conducted in a 1.75-acre area in 2014-2015. The system employed more than 1,400 heaters, vapor recovery and monitoring wells. ISTR removed approximately 99.5% (nearly 500,000 pounds) of the soil's solvent contamination.

Image credit: SRSNE project website



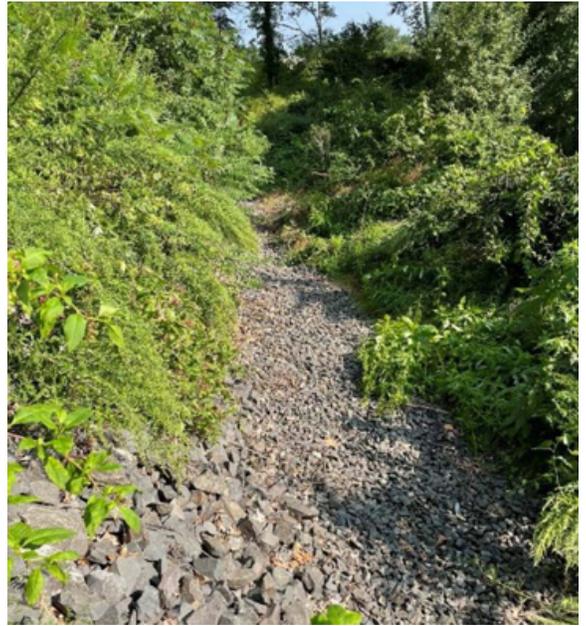
Cap Vegetation: The soil/sediment cap surface was seeded with native grasses requiring no irrigation. Routine maintenance includes yearly mowing, re-seeding any bare ground, and occasionally removing invasive vegetative species by way of herbicidal spot treatment.



Nature-Based Stormwater Controls: The workplan for cap construction integrated nature-based techniques to control stormwater during long-term remedy operation and maintenance. Vegetation clearing was limited, impervious surfaces were converted to vegetated surfaces where feasible, vegetated swales were installed, and a vegetated filter strip was established near the onsite asphalt-surfaced parking lot.



Groundwater Extraction: Contaminated groundwater is extracted from a well cluster located between the former industrial reprocessing/recycling area and the town of Southington's well field. The extraction system maintains an average constant pumping rate of 30 gallons per minute. Groundwater containment is facilitated by a downgradient sheet pile wall approximately 30 feet deep and 700 feet long. The containment wall has strategically located penetrations and downgradient galleries to direct groundwater toward the extraction wells.



Rock-Lined Channel: Native plants line the sides of a rock-lined channel designed to carry stormwater to a downgradient, onsite discharge area. The vegetation helps prevent erosion while filtering the stormwater, promoting stormwater infiltration, and slowing the flow of additional stormwater entering the channel.



Vegetated Swale: A vegetated swale along the perimeter of the soil/sediment cap collects stormwater shed from the cap's surface. The swale also receives stormwater runoff from adjacent impervious surfaces or built structures, such as the former groundwater treatment building. The building now houses auxiliary equipment, controls and supplies for the groundwater extraction and solar energy systems.



Stormwater Discharge Area: Stormwater carried by the rock-lined channel discharges at a natural wetland area near the Quinnipiac River. This discharge location helps maintain a linkage between pervious and impervious areas across the site in a contiguous manner.



Recreational Trail: The onsite rails-to-trails greenway is maintained by the town of Southington, and an information kiosk and parking lot are provided for trail users. The parking lot also provides additional parking for the nearby Southington Police Station. Remedy construction included completion of a 2,000-foot long section of the Farmington Canal Heritage Trail, a portion of which crosses the site's soil/sediment cap. The Farmington Canal Heritage Trail stretches more than 80 miles between Northampton, Massachusetts and New Haven, Connecticut.

September 2021

Solvents Recovery Service of New England, Inc. Superfund Site

<http://clu-in.org/greenremediation/profiles/srsne>



United States Environmental Protection Agency
Office of Solid Waste and Emergency Response (5203P)

For more information:
clu-in.org/greenremediation
Carlos Pachon (pachon.carlos@epa.gov)