REGENESIS®

granitor MILJÖTEKNIK

Project Profile

Implementing a PlumeStop Barrier for PFAS Plume Control at Örnsköldsvik Airport

Project Summary

At Örnsköldsvik Airport in northeastern Sweden, significant groundwater PFAS contamination had been observed, primarily originating from a fire training ground where PFAS-containing Aqueous Film-Forming Foam (AFFF) was discharged during firefighting exercises. Groundwater samples revealed high PFAS concentrations ranging from 100,000 to 200,000 ng/L, with perfluorooctane sulfonate (PFOS) making up approximately 75% of the detected PFAS mixture.

The objective of the study was to implement a strategy that would significantly reduce the migration of PFAS from the fire training area to protect the surrounding environment and community. A large-scale pilot-test of the remediation technology PlumeStop® was successfully implemented. This project was coordinated and led by the Geological Survey of Sweden (SGU) and Swedish Geotechnical Institute (SGI) and financed through the Government of Sweden's Grant no. 1:4 for Remediation and Restoration of Contaminated Sites.

A 70m-long PlumeStop barrier was installed in the forest by the fire training area to prevent further migration of the PFAS. This involved five injection rigs working in cold conditions for nine weeks. Through remediation-focused sampling to define the treatment zone, innovative injection techniques, and extensive placement validation sampling to confirm PlumeStop distribution, PFAS concentrations have been reduced by 97% to 99% downgradient of the barrier.

This project, consisting of an initial-phase application focused on the highest mass-flux section of the PFAS plume, demonstrates how offsite receptors can be protected using a zero-waste, naturally powered approach to halt PFAS migration.

Figure 1 (above) Regional satellite imagery map showing site location. Yellow circle indicates the firefighting training area. Red circle indicates surface water locations where PFAS have been detected. Blue arrow indicates groundwater flow direction. Figure provided by Sheeba Environmental and updated by REGENESIS.

Figure 2 (below) Heavy snow and freezing temperatures blanketed the region in the final weeks of the works.

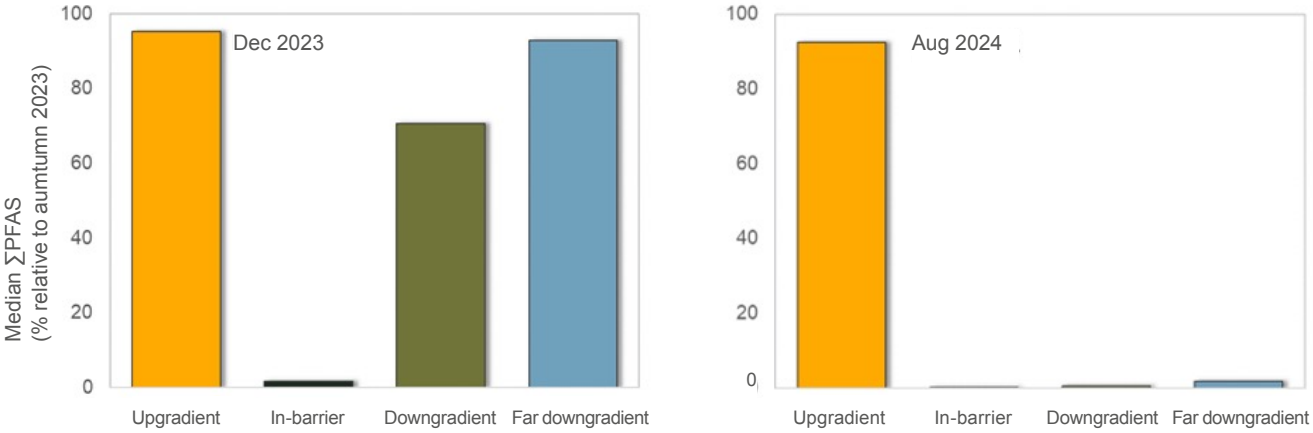
PLUME STOP® Liquid Activated Carbon

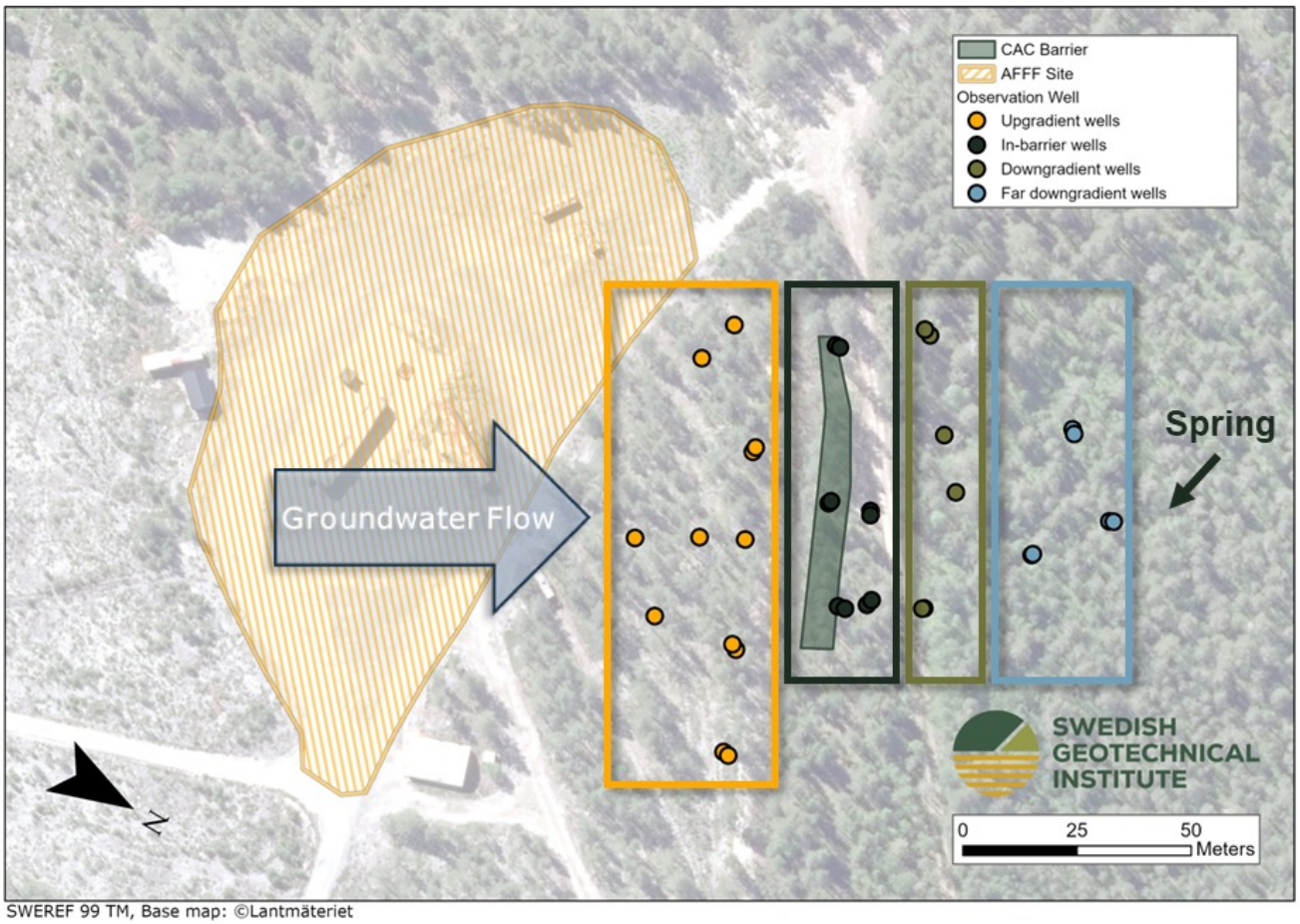
This project was completed on behalf of the Geological Survey of Sweden (SGU) and Swedish Geotechnical Institute (SGI). The consultants are Sellén & Filipovic supported by Sheeba Environmental Engineering. Project delivery by Granitor Miljöteknik supported by drilling company Geokompaniet and REGENESIS.

Preliminary Results

The results to date have shown a dramatic reduction in PFAS concentrations. Within the first month, total groundwater PFAS concentrations at the barrier were reduced by over 95%, relative to pre-barrier concentrations. Approximately six months after installation, the average reduction in the wells within the barrier reached 99.6%.

Figure 3 Figures showing response at performance monitoringwells grouped by distance to the PlumeStop barrier, demonstrating the movement of treated water downgradient over time, after barrier implementation was completed in November 2024.





These results are published with the approval of the Swedish Geotechnical Institute and are preliminary results from the Swedish Geotechnical Institute's and Geological Survey of Sweden's governmental assignment for PFAS.

Downgradient PFAS concentrations have reduced since barrier installation. Two months after application, PFAS concentrations 35 meters downgradient from the barrier began to decline and demonstrated comparable reductions over the monitoring period. Monitoring wells 50 meters downgradient have also recorded a steady decline in PFAS levels, with an overall reduction between 84.5% and 99.8%. At the spring 70m downgradient, there has been a 99.3% reduction. This demonstrates the effect of remediated water moving through the barrier. The downgradient concentrations reduce as the mass already downgradient of the barrier becomes exhausted over time.

The treatment has proved highly effective at reducing risk to the downgradient environment from PFAS contamination emanating from the fire training area, and validation monitoring will continue to be completed at the site. This highly collaborative effort sets a precedent for future PFAS plume mitigation projects at similar sites.

Figure 4 The barrier installation was carried out over nine weeks, despite the decreasing daylight hours and challenging weather conditions in the final weeks of the works.

More Information

To learn more about this project, check out the webinar recordings below or contact the Swedish Geotechnical Institute.

1. SGI Webinar Recording (Swedish language): Insight into ongoing pilot trials with activated carbon barrier for remediation of PFAS contamination Presented by Robert Earon (SGI) on 04/06/2024.

2. REGENESIS Webinar Recording (English language): In situ PFAS remediation in the snow: the application and validation results of a PlumeStop barrier installed at a Swedish airport. Presented by Sheeba Environmental and REGENESIS on 13/11/2024.

3. SGI Webinar Recording (Swedish language): Dispersion of PFAS from a source area to a recipient before and after stabilization. Presented by Robert Earon (SGI) on 04/02/2025.

Zero-waste, *in situ* remediation options for the entire PFAS source-plume system

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