



**LOCATION**  
Hungary

**PROJECT TYPE**  
Groundwater Remediation

**COMPLETION DATE**  
2018

**DESIGN FLOW**  
80,000 gpd  
300 m<sup>3</sup>/d

**TREATMENT**  
Wood Chip Bioreactor  
Vertical Flow Wetlands

**REFERENCE**  
Confidential

**PROJECT:**

# Confidential Client Hungary

**NEED**

NWC was retained by a Fortune 100 company to develop a system to treat a highly complex groundwater contamination plume from a manufacturing facility in eastern Hungary. The site included disposal pits for nitric (NO<sub>3</sub><sup>-</sup>) and sulfuric acid (SO<sub>4</sub><sup>-2</sup>) in combination with chlorinated organic compounds such as tetrachloroethene (PCE) and carbon tetrachloride (CT) and metals contamination such as molybdenum (Mo). Due to the long-term nature of site remediation, the system had to be capable of operating for a minimum of 50 years without major refurbishment.

**SOLUTION**

After extensive site modeling and materials testing, NWC designed a wood chip bioreactor for removal of nitrate, partial removal of sulfate and reductive dehalogenation of chlorinated organic compounds (including daughter products). The as-constructed system is believed to be the largest wood chip bioreactor wetland in the world. The wood chip bioreactor is followed by a small vertical flow wetland to remove residual BOD released from the wood chips.

**BENEFIT**

The local community's desire for a reliable, non-intrusive remediation system was achieved as the final system was revegetated to provide green space. The overall project objectives for a mechanically simple system with low operating and maintenance costs were also achieved. The completed system has proven to be extremely robust and capable of handling a wide variety of flows and loadings since operations commenced in early 2018.

