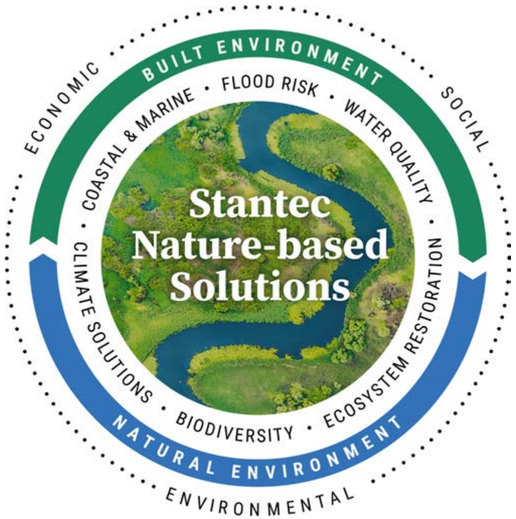
Nature-based Solutions and Mining

ENVIRONMENTAL SERVICES

Sustainable mining – turning liabilities into assets

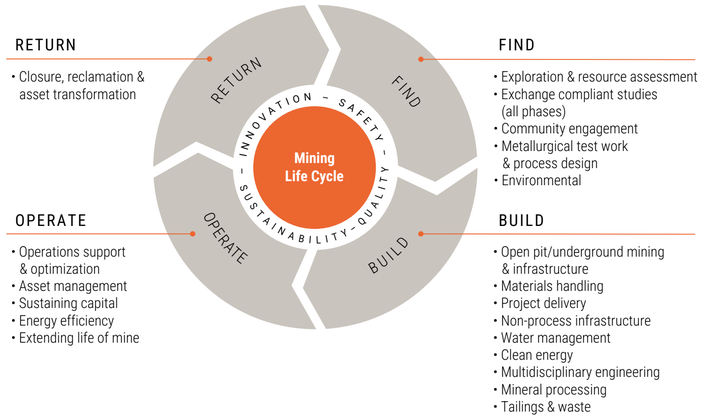
Sustainable mining considers environmental, social, and economic factors from an early stage of mine development and throughout the life of the asset. From planning through closure, nature-based solutions (NbS) add value to a mining portfolio and reduce long-term environmental liability through the uplift of ecosystems services.

Sustainable mining with NbS turns liabilities into assets. Assets that provide multiple values including carbon sequestration, improved water quality, slope stabilization, and improved biodiversity, all of which result in reduced O&M and reduced need for repairs and reinvestment. These assets in turn improve public perception, improve the social license to operate, and support ESG goals.



Holden Mine, Chelan County, Washington

Mining Lifecycle



Nature-based Solutions Mining Services

Through Stantec's multidisciplinary capabilities, we're able to provide NbS services throughout the entire lifecycle of a mining project, including but not limited to:

- Bioengineering for road construction and slope stabilization
- Reforestation for tailings stabilization and dust suppression
- Floodplain restoration to improve conveyance and reduce flood risk
- Engineered wetlands for mine water treatment
- Portfolio assessment for mitigation planning and carbon crediting

Project Experience

BROKEN HAMMER MINE PASSIVE TREATMENT SYSTEM
Sudbury, Ontario

Stantec developed a design for passive bioreactor to treat residual metals (specifically copper) in water stored in the Broken Hammer Mine (Broken Hammer) open pit in Sudbury, Ontario. Current management practices include annual lime dosing to manage metal exceedances. Water quality modeling predicted such treatment would be required in the long term. As an alternative to active dosing, Stantec recommended and developed a design for a passive approach using a sulphate reducing bioreactor design. To fully test the approach, we prepared a pilot scale design and implemented testing on site utilizing local materials (i.e., compost and stone) over two years. Positive performance results of the pilot led to the development of a full-scale bioreactor design and permitting. Construction is anticipated in spring/summer of 2025.

HOLDEN MINE RECLAMATION PROJECT
Chelan County, Washington

The Holden Mine produced over 90,000 tons of copper in its lifetime; it employed 62 miles of underground tunnels, leaving ~300,000 m^3 of waste rock and 8.5 MT of mill tailings covering 50 HA of National Forest land. Rio Tinto retained Stantec to develop the detailed engineering design and remediate past environmental problems at the mine. The $500M legacy mine CERCLA project required expertise in mine remediation. We conceived a system of mine-closure components: infrastructure improvements, groundwater collection and treatment, demolition, and restoration to re-establish vegetation consistent with the surrounding forest. Our team also provided on-site quality assurance and oversight during the remedial action.

EXELON'S PASSIVE TREATMENT OF ACIDIC WATERS
Waugh Chapel, Maryland

Stantec developed a design for the Successive Alkalinity Producing System to passively treat acidic, metals-laden water and reduce the environmental impacts of a groundwater plume found in an overlying ash landfill on receiving waterways. The design has proven valuable for meeting NPDES requirements, watershed restoration, and even pre-treating AMD so it could be used in the hydraulic fracturing process for natural gas development. The system has operated for over 10 years with minimal replenishment of the compost and limestone layers, achieving low operational costs, while meeting the required effluent water quality standards.

PASSIVE METAL TREATMENT
El Dorado, Arkansas

Stantec was contracted to evaluate two failing engineered wetlands designed by others to treat metal (lead, selenium, zinc, and copper) impacted stormwater runoff from an industrial facility. Stantec completed a design review and field inspection of the systems and determined the system failure. In addition, we performed head loss calculations and determined the original horizontal flow design resulted in short circuiting and decreased hydraulic retention time. To improve treatment and compliance, we prepared a rehabilitation design to repair both systems by converting the systems into downflow filters. Rehabilitation of the engineered wetlands was completed in the fall of 2019, with Stantec providing full time construction oversight. In 2020, the design won the Diamond Award for Excellence in Environmental Leadership from the Arkansas Environmental Federation as well as the American Chemistry Council's Waste Minimization, Reuse, and Recycling Award.

Stantec

Learn more about our NbS services:

Nature-based Solutions
Ecosystem Restoration
Natural Capital
Coastal Resiliency
Mining, Minerals & Metals

Meet our experts

Dom Kempson
Vice President, Environmental Services, Nature-based Solutions

Amanda Ludlow
Principal, Nature-based Treatment Specialist

Ben Veach
Mining Sector Leader, US, Environmental Services

Scott Trusler
Vice President, Mining Sector Leader, Canada, Environmental Services

STANTEC.COM