

Sustainability

Today's Business Solutions for Tomorrow's Generation

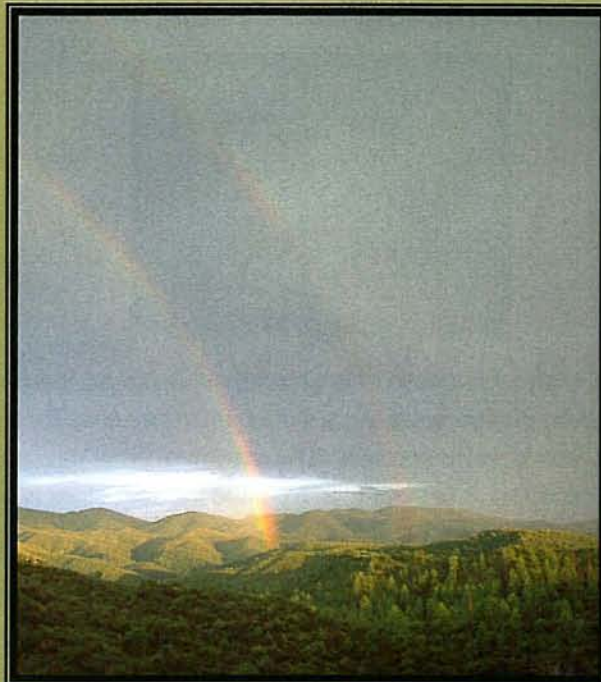
Sustainability has many definitions, but the basic principles and concepts remain constant: balancing a growing economy, protecting the environment, and acting socially responsible so they together lead to an improved quality of life for ourselves and future generations.

Sustainable development is defined as development that "meets the needs of the present generation without compromising the ability of future generations to meet their needs." It follows that the success of any project or design should be judged in relation to its contribution to, both human and ecosystem well-being. Cardinal Resources can help achieve these goals through innovative approaches to clean water, wastewater treatment, stormwater management, Greenhouse Gas mitigation and energy management.

Cardinal Resources is a Pittsburgh based company with a global presence. We are committed to developing environmental solutions and systems that promote sustainability and at the same time economically solve real-world problems.

"We have not inherited the world from our forefathers — we have borrowed it from our children."

- Kashmiri proverb

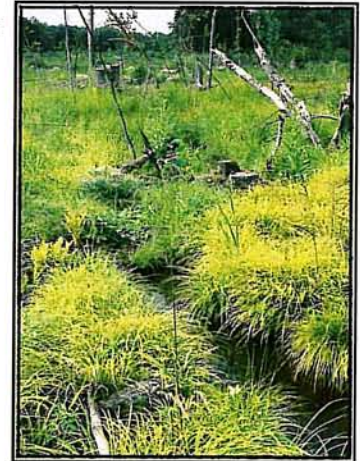


Sustainable Solutions to Water Issues

Cardinal Resources offers a variety of innovative, alternative energy and low energy approaches to water supply, stormwater management, rainwater harvesting, and wastewater management that reduce energy consumption, utilize solar energy, and capture Green House Gases, the source of global warming.

Rainwater Harvesting and Stormwater Management Making a Problem a Resource through the Grey Bird Approach

Rainwater and stormwater runoffs are traditionally problems that affect development and have significant impacts to our rivers and streams. Cardinal Resources' turns that equation around with our Grey Bird Approach. The Grey Bird Approach develops unique solutions that incorporates technologies such as Rain Water Harvesting systems that reduce the use of drinking water for landscaping or sanitation, underflow treatment gardens and wetlands that capture greenhouse gases while treating stormwater without creating insect problems, passive treatment systems and using solar powered treatment systems such as a modified Red Bird System to create clean water from dirty runoff.



The Grey Bird Approach can also be used to biologically treat wastewater using similar innovated treatment options. While traditional treatment is energy and chemically intensive, a Grey Bird Approach can treat wastewater in a greenhouse like aqua-garden setting that treats the water, while capturing greenhouse gases, which can offset your other sources of greenhouse gases.

The Grey Bird Approach, a new direction in green sustainable development.

The Red Bird System



The Red Bird system is an elegant, high-tech, green energy solution designed to function in a low-tech environment. Housed in a 20-foot intermodal container, a single solar-powered Red Bird will produce clean water for 1,000 people per day from a variety of water sources. The combination of energy source, purification technology, serviceability, and sustainability in a setting with limited infrastructure is exceptional.

Originally developed for use in developing and emerging countries, the Red Bird can be part of a sustainable green development by providing consistent clean drinking water using only the sun for power and salt for disinfection. The Red Bird can also be used for treating grey water, and stormwater for reuse in areas such as landscaping, and ponds.

Sustainable Solutions

Green Mining Program

Historically mining created extensive environmental impacts, and was one of the most non sustainable industries. Green Mining is a new movement that seeks to change the game by minimizing the impacts and creating sustainable developments.



Cardinal Resources was contracted to design and implement a Green Mining Program that includes environmental management, water supply, and permitting at several remote mine sites in Arizona. These sites have no existing infrastructure and power is provided using diesel generators. As part of the Green Program our client wanted to reduce their Greenhouse Gas emission and water hauling while maximizing water recycling.

Cardinal Resources designed, installed, and implemented a solar-powered groundwater pumping system to provide water to the processing facility, to a wildlife impact mitigation system, and for a reclamation nursery. In addition we designed and installed a system to treat water from an historic mine using naturally renewable media in a Red Bird filter. This system eliminated an environmental problem while providing water for processing.

Water is pumped 24 hours a day without the use of diesel fuel or other non-renewable resources. Sustainability and Green Mining Goals are addressed through the reduction of hydrocarbon emissions, reduction in fuel costs, and the use of the water in maintaining a nursery of native plants that are used in reclamation.

Phytoremediation Plantation

North Carolina



1999



2006

Cardinal Resources was asked to develop a sustainable, low impact approach to cleaning up an historic groundwater contamination problem. In response, Cardinal Resources developed a phytoremediation approach for intercepting and treating the groundwater using a mix of deep rooting, high-transpiration rate trees. As the plantation grew the trees have been removing contamination from groundwater by up taking impacted water and breaking down the organics.

This approach not only cleans up contamination it reduces Greenhouse Gas. The plantation continues to grow, while providing habitat, green space, and ever increasing carbon absorption.

Sustainable Solutions for the Future

Cardinal Resources has a tradition of responsiveness, professionalism and service that will continue to help fuel the growth of your business, while addressing environmental concerns.

Some of the areas where we can help you green up include:

- **Green infrastructure solutions**
- **Water and wastewater systems**
- **Rainwater harvesting and storm water management**
- **Evaluate and minimize CO₂ and other greenhouse gases**
- **Treatment wetlands**
- **Measurement and verification for LEED credit**
- **Energy audits and alternative energy options**
- **Soil, groundwater, and sediment remediation**



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