

Statement of
Qualifications



Restoration Implementation



We provide integrated restoration implementation services to support all types of projects—from municipalities to federal agencies and local land developers to international corporations.

Our teams across the country have the expertise to implement and maintain the restoration strategies developed to meet the unique criteria and ecological challenges of each project.

With decades of ecological restoration experience, Cardno provides solutions to environmental challenges.



Combining our comprehensive knowledge of ecosystems, engineering expertise, state-of-the-art technology, and decades of restoration and regulatory experience, we serve public and private clients by developing and implementing effective, cost-efficient solutions to meet your project objectives.

Specializing in large scale and complex restorations

Cardno has extensive experience developing and implementing large, complex, multi-million dollar restoration projects. Our professional teams manage changing field conditions and provide clear written and verbal communications to all stakeholders in order to deliver successful outcomes for clients and agency staff members.

Examples of project types include:

- > Mitigation of wetland, river, stream, and lake impacts
- > Dam removal, fish passage, and aquatic ecosystem restoration
- > Emergency ecological assessment and restoration for spill incidents
- > Restoration of Brownfields, Superfund, Area of Concern, or other contaminated sites
- > Land management, habitat conservation and mitigation plans
- > Linear corridor planning and maintenance

Superior safety protocols, training, and bonding capability

Cardno has established relationships with surety companies and banks to provide multi-million-dollar bid, performance, and maintenance bonds. In addition, Cardno has a strong culture of safety implemented through our daily focus on our Zero Harm goal by continually improving our safety systems and maintaining vigilance at our workplaces. Our staff has superior safety compliance records, and our training programs provide them with the high-level credentials required by large industrial clients. Staff credentials include:

- > HAZWOPER 40-hour training
- > OSHA 10-hour construction training
- > USACE Construction Quality Management training

Our administrative staff provides timely certified payrolls and implements prevailing wage and Davis-Bacon regulations properly. We are registered with multiple safety rating agencies, such as ISNetwork, which provide reports verifying our outstanding safety performance.

Local support with global expertise

Cardno's ecologists, biologists, and other restoration specialists have supported our clients' local and multi-national restoration projects in countries on six continents. Working with companies, governments, and agencies at all levels worldwide provides Cardno with the diverse knowledge to better serve you with innovative and sustainable solutions that deliver lasting value in your communities.

Our offices across the Americas are strategically located to make it easy for our team to get to your facilities or project sites, increasing efficiency. We have a deep understanding of national and local environmental, regulatory, financial, and social conditions. Our global capability and local expertise combine to help you reduce risks, resolve challenges, improve performance, and increase resilience.

We create customized approaches that deliver high-quality service and sustainable business solutions.



Cardno's skilled professionals provide comprehensive environmental restoration services for any aquatic or terrestrial habitat.

Streams, rivers, and lakes

Cardno uses scientific data and fundamental principles of stream and river ecology and hydrology to create solutions designed to meet the business needs of each project. Combining our engineering professionals with our ecological and biological experts allows us to develop holistic and sustainable solutions

that address business impacts while optimizing the potential of stream, river, or lake improvements.

Our restoration services address issues associated with limiting factors such as flow, water quality, instream habitat complexity, off-channel habitat, and floodplain connectivity. Our restoration design and implementation processes include:

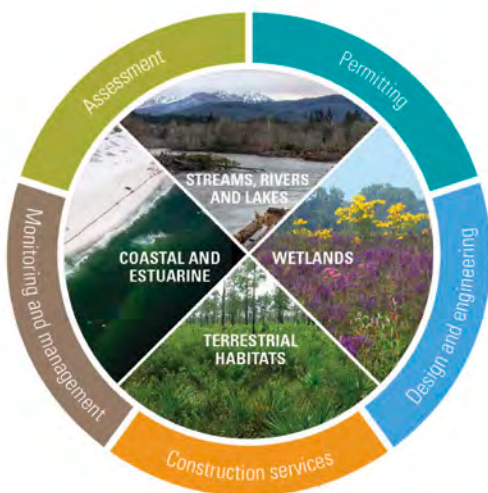
- > Ecologists, biologists, and technical support staff who provide detailed ecological assessments
- > Geologists, geomorphologists, and river engineers who thoroughly analyze existing river and stream conditions and develop comprehensive restoration solutions to allow fish, animals, and plants to thrive
- > Water resource engineers who perform hydraulic and hydrologic modeling to restore stream function and integrity
- > Customized water balance modeling and sediment transport modeling to improve water quality
- > Geomorphologists who understand fluvial process impacts of stormwater, floodwater, and erosion impacts on a site-specific scale and on a watershed scale
- > Floodplain and channel migration zone studies, dam removal, and hydroelectric relicensing assistance to support healthy fish passage and aquatic ecology.

Wetlands

Cardno combines regulatory experience with technical expertise to provide comprehensive wetland restoration services. We are an established leader in siting, permitting, designing, developing, executing, and maintaining successful projects through detailed stakeholder coordination, landscape analysis, in-depth understanding of ecologies, construction supervision, and habitat management.

We have helped hundreds of clients across the US mitigate impacts or restore functions to jurisdictional and non-jurisdictional wetlands—from small-scale biological treatment trains that provide site-specific stormwater treatment to 100-acre banking projects that mitigate impacts to entire watersheds.

Assessing potential impacts to wetlands in the early phases of land development projects can help avoid project delays. Cardno has completed thousands of wetland and floodway-related projects and permit applications through U.S. Army Corps of Engineers districts and state agencies as well as local regulations. Our proactive communication style and ability to identify solutions and obtain permits quickly keep our clients' projects moving forward.





Our Professional Wetland Scientists, ecologists, biologists, and other scientists provide expertise in:

- > Wetland determination
- > Wetland delineation
- > Wetland mitigation planning
- > Mitigation banking
- > Wetland restoration
- > Mitigation monitoring
- > Mitigation for wildlife habitat

Terrestrial habitats

Cardno is a leader in designing, developing, and executing successful habitat management projects that address unique challenges and mitigate impacts, particularly to listed or endangered species. Our multidisciplinary approach allows us to design, implement, monitor, and maintain terrestrial habitats on sites, including unused government and industrial land, parks, golf courses, and nature reserves. We help enhance, restore, and maintain terrestrial habitats by:

- > Using leading scientific methods to perform detailed wildlife and habitat surveys, including listed or endangered species
- > Designing adaptive management plans for invasive and exotic species
- > Constructing and managing sustainable restoration design
- > Performing land management to maintain or improve habitat

Coastal and estuarine

Coastal regions and estuaries are complex, sensitive ecosystems. The expertise of our multidisciplinary team of scientists and engineers ranges from the shoreline to the deep water environment. Our professionals address the causes of coastal degradation and implement surveys and restoration plans for projects, including dune, beach, mangrove, and coral restoration. We ask the right questions, develop comprehensive studies, analyze the results, and implement the restoration plans to support project objectives. To understand these complex coastal areas, Cardno performs:

- > Geomorphic mapping
- > Sediment transport modeling
- > Fish population estimates and riparian inventories
- > Wave energy
- > Hydrology and hydraulics
- > Littoral and fluvial sediment transport
- > Bluff stability
- > Contamination from pollutants, flood control, or water diversion
- > Nearshore ecology

Integrated service offerings

Cardno's multidisciplinary teams develop tailored solutions to provide the right level of support for your restoration projects, no matter how large or small.

We provide comprehensive services in the following disciplines:

- > Construction services
- > Survey and utility coordination
- > Geomorphology and modeling
- > Maintenance and monitoring
- > Permitting and regulatory compliance
- > Endangered species
- > Natural Resource Damage Assessment (NRDA)
- > Plant supply and installation
- > Site assessment, planning, and design
- > Site maintenance and management
- > Geospatial services

Our environmental engineers and scientists have the expertise necessary to analyze damage to complex ecosystems, plan cost-effective restorations, monitor sites to ensure they are restored to regulatory requirements, and manage your potential NRDA liabilities.

Construction services

Cardno delivers a diverse range of services to construct your restoration project. Our teams have designed and implemented Best Management Practices (BMPs). From site preparation and plant installation to construction oversight and post-construction monitoring and maintenance, Cardno verifies that project design standards are met, ensures long-term project success, and consistently completes projects on time and on budget.

Survey and utility coordination

For over 50 years Cardno has delivered high quality surveying and utility coordination services to a diverse range of industries required for restoration design and construction. Our comprehensive SUE techniques give project owners, designers, engineers, and contractors the opportunity to make informed decisions to reduce risk by incorporating the most modern and complete underground utility data into project plans and designs. We assist clients with:

- > Right-of-way & route surveys
- > Cadastral & boundary surveys
- > Topographic mapping
- > Construction surveys & staking
- > Utility as-built surveys
- > Location of subsurface utilities

Cardno assists clients in initial project planning with surveying, civil engineering, and landscape architecture services. Our civil engineers and landscape architects can assist with planning and designing a wide variety of implementation projects. Their preliminary and final designs are often innovative and always cost-effective based on a comprehensive knowledge of ever-changing technological developments and jurisdictional requirements.

Geomorphology and modeling

Our deeper understanding of how rivers, streams, and floodwater erode the earth's surface and create, transport, and deposit sediment and debris is coupled with cutting-edge data collection and modeling technology.

By integrating our approach to this type of project work, Cardno engineers design naturally functioning channels, banks, and floodplains that not only protect habitats and infrastructure, but also are self-maintaining or have low maintenance requirements. We pioneered the design of Engineered

Log Jam (ELJ) technology and have developed self-mitigating "dolotimber" technology that has been used to protect riverside communities and enhance endangered or threatened fish habitats.

Our water resource engineers combine hydrologic and hydraulic modeling with geospatial services to anticipate existing conditions. Our integrated 1, 2, and 3D models simulate water quantity, quality, runoff, hydraulics, and circulation and incorporate sediment transport and pollutant and nutrient concentrations. Our restoration teams visualize flow and flooding, evaluate water quality improvements, predict restoration performance, and resolve issues before they happen. Some of our modeling capabilities include:

- > Watershed and water quality modeling: Our models simulate hydrology and pollutant loading of constituents; compare build-out scenarios, water quality protection strategies, and BMPs; and develop Numeric Nutrient Criteria (NNC) including Total Maximum Daily Loads (TMDLs) totals for watershed assessments and management plans.
- > Hydrology, hydraulic & river modeling: We help you address flow routing, hydrodynamic behavior, sediment transport, bank scour, and more using a wide variety high-tech software programs.

Cardno's models depict real-world conditions and help us design restoration projects that satisfy your stakeholder needs, comply with regulatory requirements, manage risk, meet your objectives, and save you time and money.

Maintenance and monitoring

Cardno has experts who can scale the appropriate level of effort to ensure your restoration project's continued success. We address important restoration priorities such as water quality, endangered or threatened

species, invasive or exotic species control, and sensitive aquatic and wildlife habitats. Our maintenance and monitoring services include:

- > Prescribed burning
- > Biological control of species
- > Use of herbicides for exotic & invasive species
- > Surface and groundwater monitoring
- > Permit compliance
- > Remote instream monitoring
- > Adaptive management planning for invasive and exotic species
- > Mowing

We work closely with regulatory agencies, landowners, and other stakeholders and combine regulatory experience with technical knowledge to provide thorough land, habitat, and watershed management plans.

Permitting and regulatory compliance

Cardno has negotiated and obtained tens of thousands of permits, approvals, and entitlements to ensure our clients meet federal, state, and local regulations and keep restoration projects on track. Over the past decades, we have secured environmental and cultural resource permits and helped ensure compliance. By combining ecological and cultural expertise, Cardno provides time and expense efficiencies to move projects ahead with reduced costs and ongoing compliance. We provide permitting and compliance expertise for regulatory programs, including:

- > Strategic & regulatory guidance on National Environmental Policy Act (NEPA) and state laws
- > National Historic Preservation Act Section 106
- > Habitat Conservation Plan development
- > Endangered Species Act (ESA) - Sections 7 and 10 federal and state regulations
- > Clean Water Act Sections 401 and 404, and floodway



- > Incidental Take Permit (ITP) application package preparation
- > Federal Energy Regulatory Commission (FERC) project siting
- > Municipal & state stormwater regulations
- > Toxic Substances Control Act (TSCA) compliance
- > Mitigation banking; wetlands, wildlife habitat

We coordinate with stakeholders and maintain effective working relationships with regulatory agencies to navigate local, county, state, and federal laws and regulations that govern compliance in the early stages of projects. We expedite required permits and maintain compliance to support the regulations involving streams, rivers, lakes, wetlands, terrestrial habitats, and coastal regions.

Endangered species

Cardno prepares endangered, threatened, and rare species reviews and assessments. Such reviews include acquiring all state-protected species occurrence records and formulating recommended maintenance practices in proximity to an endangered species to minimize or eliminate potential impacts.

We also identify environmental permits as part of maintenance activities. Cardno works closely with your environmental staff and construction contractor so that our experts are available immediately for endangered species monitoring to ensure compliance and verify avoidance measures are in place. We provide endangered species expertise for regulatory programs, including:

- > NEPA/SEPA compliance
- > ESA compliance
- > Effects analyses of activities
- > Natural resources management
- > Assessments
- > Botanical surveys

- > Mapping
- > Permitting
- > Natural Resource Damage Assessment (NRDA)

After cleaning a hazardous substance release to eliminate or reduce risks to human health and the environment, the next step is to assess damage to natural resources. Cardno's NRDA experience includes:

- > Participation in NRDA's at over 85 sites and responded to over 130 spills in more than 40 states in the last 25 years
- > Collaboration with federal, state, and tribal Natural Resource Trustees
- > Detailed assessments of difficult biological resources such as mobile animal populations, endangered species, and sensitive habitats

Plant supply and installation

Choosing plant species based on conditions specific to the site and to the region is important because native plants are adapted to the region's soil, hydrology, and climate and have evolved defenses to local diseases and insects. Cardno uses BMPs to address each site's unique needs for planting and successful establishment for any environment across the US. Since 1994, Cardno has operated a 130-acre, full-service native plant nursery to provide quality seed and plant material across the Midwest and the Great Lakes area. Cardno's Native Plant Nursery has focused exclusively on native seed, plants, and bioengineering materials for native landscape, restoration, and mitigation projects.

Learn more about our native plant materials on our nursery website at www.cardnonativeplantnursery.com

Site assessment, planning, and design

Cardno can help you understand the constraints and opportunities offered by

your project site. We give you the site information needed to select restoration sites and know whether site objectives will be easy or difficult to attain. The information we provide maximizes value by letting you structure site planning to take advantage of available opportunities and avoid costly permitting or engineering problems. Some of the site assessment services Cardno provides include:

- > Wetland assessments and delineations
- > Mitigation bank site identification
- > Phase I and Phase II Environmental Site Assessments
- > Phase I, II, and III archaeological assessments
- > GIS data collection and management
- > Natural Resource Damage Assessments

After site selection and assessment, Cardno can provide you with integrated services to manage your project's full life-cycle, including site preparation before construction, conservation design, stormwater management, and drafting and implementing management plans. We can help you optimize the long-term benefits of your restoration project site through our staff's wide range of expertise.

Our field biologists and support staff use unique methods and innovative technologies, incorporated with GPS and GIS capabilities, to perform detailed, comprehensive biological assessments quickly across large areas. Our species and habitat assessment services and experience include:

- > Threatened and endangered species
- > Chiropteran and avian (bat and bird) & other biological assessments
- > Botanical inventories

Cardno's restoration experts have unparalleled experience at designing restoration projects, particularly large-scale and complex

restorations. Our teams engage clients in planning processes at the regional, municipal, and site scale to develop feasible project alternatives. Using decision analysis and facilitated workshops help guide collaborative efforts for funding, planning, building, and operating complex projects across multiple jurisdictions. Whether we are integrating site assessment and modeling from the start of the design process or performing design-build with contractor coordination, our scientists and planners create functional, efficient, and sustainable designs, including:

- > Bank stabilizations
- > Shoreline softening
- > Fresh and saltwater wetlands and marshes
- > Mitigation banks
- > Stream daylighting
- > Fish ladders and natural fish ways
- > Stormwater treatment systems
- > Wastewater treatment wetlands
- > Floodwater storage
- > Water quality enhancements
- > Prairie, uplands, and forests
- > Riparian corridor enhancements
- > Aquatic habitats
- > Sand and barrier island
- > Low Impact Design
- > Erosion control
- > Resource engineering
- > Cultural resources management
- > Ecosystem & habitat restoration
- > Stream and river restoration
- > Green infrastructure
- > Site management

Cardno's teams create effective, yet flexible plans to support long-term project success. Using our extensive GPS/GIS capabilities, our staff combines cutting edge technology with site-specific hydrologic, ecologic, and botanical knowledge to identify and quantify problem areas, potential threats, and to track the progress of maintenance and restoration to meet our clients' objectives.

Whether we are integrating site assessment and modeling from the start of our design process or performing time-efficient design-build with detailed contractor coordination, our multi-disciplinary approach ensures the design of your restoration efforts.

Site maintenance and management

Successful site management begins with quality planning. Cardno creates effective, yet flexible plans to support long-term project success and to maintain regulatory compliance. Using our extensive GPS/GIS (geospatial data) capabilities, our staff combines cutting edge technology with specific ecological knowledge to identify and quantify problem areas, potential threats, and to track and manage the progress of restoration efforts.

- > Site inspection & monitoring
- > Natural area maintenance
- > Invasive species maintenance
- > Biological & botanical surveys
- > Habitat management
- > Supporting regulatory compliance

Geospatial services

Cardno's geospatial services are based on more than 20 years of experience in Geographic Information Systems (GIS) consulting, data conversion, and other practical expertise in geospatial information technology. GIS captures comprehensive data, generates precise imagery, and demonstrates the unique perspective these tools can provide in minutes.

Cardno uses GIS to map watershed attributes for discussion and analysis as an important component of lake studies to evaluate water quality and watershed conditions; to map land forms to understand unique topographic, soil, and other unique characteristics for land management; and to establish

precise boundary limits and any essential property constraints.

Advances in remote sensing using Remotely Piloted Aircraft (RPA) and mobile mapping software are transforming the design and construction of restoration projects. These technologies acquire and analyze data with dense 3D point clouds and imagery with sub-centimeter resolution that accelerate the speed and efficiency with which Cardno's engineers and project managers can do their work.

Our geospatial services staff includes: GIS analysts and consultants, certified Geographic Information Systems Professionals, project managers, aerial photo interpreters, information technology professionals, and HAZWOPER certified field technicians.

Our services include:

- > Creating and acquiring geographic data
- > Spatial analysis
- > CAD and cartographic design
- > LiDAR mapping
- > Aerial surveying and data integration
- > Field surveying
- > Spatial database application
- > Paper and digital map creation
- > Technical analysis
- > Statistical sampling design and analysis



East Branch Grand Calumet River Area of Concern

Client: J F Brennan Company, Inc.

Location: Hammond, Indiana

The Grand Calumet River Area of Concern (AOC) is undergoing an \$80-million cleanup effort to remove contaminated sediment and restore the degraded wetland habitat along the East Branch Grand Calumet River. As a subcontractor to the Great Lakes Sediment Remediation, LLC joint venture, Cardno restored the native wetland and riparian corridor along a 1.8-mile stretch of the river in northwest Indiana.

The project's driver was sediment remediation, but it also actively restored aquatic ecosystems, water quality, and poor substrate conditions through integrative management and restoration techniques. Cardno performed all the ecological restoration activities, including: provided and installed over 180,000 native wetland plants, approximately 40 acres of native seed, over 5,000 shrubs and live stakes, and monitored and maintained planted areas.

The project team received the **2015 Gold Environmental Excellence Award for Environmental Dredging from the Western Dredging Association.**

Cardno has provided a range of environmental consulting services in the AOC more than 20 years.



Hudson River Riverine Fringing Wetland Planting & Maintenance

Client: General Electric Company

Location: Saratoga County, New York

Cardno provided habitat planting and maintenance services in association with the Hudson River Dredging Project. Cardno provided and installed more than 140,000 native wetland plants, approximately 13 acres of native seed, and more than 800 shrubs and live stakes. All work was conducted from boats within the marine environment and included significant coordination with construction contractors. Cardno monitors and maintains the planted areas.



Panama City Crayfish (PCC) Habitat Restoration

Client: Wildlands Conservation / U.S. Fish and Wildlife Service

Location: Bay County, Florida

The Panama City crayfish (*Procambarus ecofinae*) is a small freshwater crustacean found only in a small portion of Bay County, Florida. It is currently listed as a Species of Greatest Conservation Concern by the

Florida Fish and Wildlife Conservation Commission (FFWCC). Cardno secured additional funding through the FFWCC's Aquatic Habitat Restoration and Enhancement Section (AHRES) to create a management plan, secure state and federal wetland permits, and implement the prescribed land management activities for a 10-acre restoration tract. High Point Preserve had been overtaken by the expansion of Titi (*Cliftonia monophylla* and *Cyrilla racemiflora*) as the result of fire exclusion and the restoration strategy focused on the restoration back to a savannah and savannah-bay swamp ecotone. As a result of these efforts, savannah vegetation is now thriving. The return of this savannah will allow an expansion of the small, already present population of PCC as well as promote success of any translocated individuals.



Santa Rosa Island Beach Nourishment and Dune Restoration Project

Client: Eglin Air Force Base

Location: Gulf of Mexico, Okaloosa County, Florida

Cardno performed coastal environmental services for a beach nourishment and dune restoration project for Eglin Air Force Base along a 2.5-mile section of beach on Santa Rosa Island. The island is part of a delicate barrier island chain with sensitive coastal resources and habitat along the northern

Gulf of Mexico, Cardno provided comprehensive ecological services for the rehabilitation of three military test facilities to further stabilize and protect the coastal facilities. Cardno performed federal/state wetland permitting, threatened and endangered species assessment for least terns, survey, permitting/agency coordination, monitoring and construction oversight, NPDES inspection and reporting, dune planting and monitoring of a colony of least terns. Cardno conducted post-construction annual monitoring for project success rate and status of the restored beach and dune area. Annual monitoring proved meeting project and planting success criteria following approval by state and federal agencies.



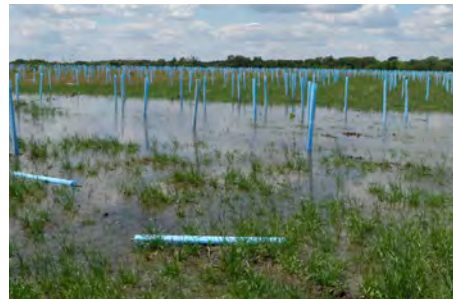
The Wilds Turnkey Stream Mitigation

Client: Enterprise Products

Location: Cumberland, Guernsey County, Ohio

Cardno prepared and implemented a mitigation plan to enhance and restore approximately 18,000 linear feet of stream corridor at the International Center for the Preservation of Wild Animals. We assessed and selected eight stream segments and prepared final approved restoration plans to satisfy all offsite, permittee-responsible, mitigation requirements. The final plans involved managing invasive species, restoring stream

banks, constructing in-stream structures, seeding the native riparian buffer, planting native trees, shrubs, and wetlands. Managing invasive species included several removal techniques. Selected areas then were seeded with native prairie and wetland plants. More than 14,000 trees and shrubs were planted. Several beaver dams were removed, and banks were reshaped to re-establish free-flowing streams. In-stream restoration techniques were incorporated to reduce erosion and improve aquatic habitat. Cardno worked with the landowner to permanently protect all areas with restrictive Environmental Covenants and is currently providing maintenance and monitoring services.



Great Miami Mitigation Bank

Client: Five Rivers MetroParks

Location: Montgomery County, Ohio

As part of their ongoing effort to provide conservation, educational, and outdoor recreational activities and to preserve the natural heritage of Montgomery County, Five Rivers MetroParks wanted to establish the Great Miami Mitigation Bank (GMMB), southwest Ohio's first wetland mitigation bank.

Cardno identified sites suitable for a new 360-acre park with significant wetland and stream mitigation banking opportunities and provided final site recommendations to the Five Rivers MetroParks Board of Directors. We then designed and

permitted GMMB, which includes more than 60 wetland restoration credits, 4,900 headwater habitat stream restoration credits, 19.4 wetland and riparian buffer credits, and 22 upland forest, tall grass prairie, and oak savannah habitat credits. The GMMB is the first and only stream mitigation bank in Ohio to provide 1:1 stream restoration credits.



CF Industries Restoration Activities

Client: CF Industries, Inc.

Location: Hillsborough County, Florida

During the region's first team permitting project, Cardno produced a detailed plan to restore 1,900 acres of upland pasture to flatwoods, enhance 680 acres of wetlands, restore 53 acres of wetlands, and create 139 acres of forested, herbaceous, and ephemeral wetlands. The plan, meant to offset unavoidable impacts caused by an expansion of phosphogypsum storage facilities, included a comprehensive planting design (incorporating direct seeding of native species) and a detailed monitoring protocol for all restored, enhanced, and created wetlands and uplands. During construction, Cardno made field adjustments to better ensure survival of planted and seeded species. Cardno installed all wetland species and has monitored and maintained the wetland mitigation areas. Cardno also has provided nuisance and invasive species control

in restored upland habitats. Cardno assisted with regulatory agency coordination in determining if success criteria were being met and negotiated release from monitoring requirements when appropriate.



Post-Storm Dune Restoration

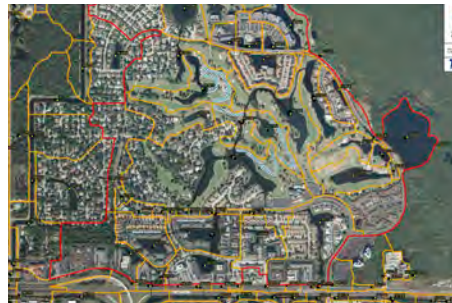
Client: City of Jacksonville

Location: Duval County Beaches, Florida

Cardno's restoration team provided planting services for the Duval County Beaches Post-Storm Dune Restoration project.

Cardno's services included: planting of over 620,000 native dune plants across constructed dunes; development of daily planting reports, weekly summaries, and monthly status reports; and management and scheduling to ensure timely delivery of plant material. Cardno worked closely with the City of Jacksonville, Florida, and their third-party project management consultant to ensure deadlines and project specifications, including plant spacing, plant quality, and technical planting requirements were met effectively and with the highest quality product.

The project was completed on time and all survival warranties were met according to the project specifications.



Feather Sound Restoration

Client: Scheda Ecological Services

Location: Clearwater, Florida

Due to local land development, the Feather Sound community experienced flooding in residential areas. In addition, Old Tampa Bay experienced a reduction in water quality and an increase in flooding, subsequently impacting ecological functions such as seagrass production, fish habitat, and algal blooms.

Cardno performed water quality modeling and design to implement the first in a series of BMPs to help reduce flooding and improve water quality on an intermediate level stormwater conveyance system in Feather Sound. The BMPs included designing and developing pollutant reduction calculations within the Feather Sound Golf Course to help reduce nitrogen impacts to Old Tampa Bay and decrease flooding. Cardno evaluated existing watershed models and developed a preliminary water quality model calculating pollutant removal, including recommended modifications to stream shape and flow to decrease nitrogen loading to Feather Sound.



Cypress Creek Wellfield Land Management Plan and Conservation Bank

Client: Tampa Bay Water

Location: Pasco County, Florida

Cardno established and manages the 1,000-acre gopher tortoise recipient site on the Cypress Creek Wellfield. Cardno obtained approvals from the Florida Fish and Wildlife Conservation Commission to use the site as a multiple-project, gopher tortoise recipient site that can accept approximately 700 additional gopher tortoises from on-site and off-site projects. Cardno prepared and implemented a long-term holistic land management plan for the property that focuses on improving the habitat for gopher tortoises thereby increasing the amount of gopher tortoises that can be relocated to the property. The plan also includes and benefits several other faunal species. Native upland habitats restoration activities on the property include prescribed fires, roller-chopping, mulching, logging, mowing, and installation and maintenance of fire lines. We established permanent vegetative and wildlife monitoring transects, and we have collected baseline and annual data to assess the success of the land management activities. Timber harvests in overgrown pine flatwoods will be used as a cost-effective management tool to restore the flatwoods. We have successfully controlled nuisance, invasive vegetation on the property, including cogon grass.



Seneca Bluffs Natural Habitat Park Restoration

Client: USACE Buffalo District

Location: Buffalo, New York

The Seneca Bluffs Natural Habitat Park is located along the Buffalo River and consists of approximately 15 acres of riparian floodplain located in a heavily urbanized area. Seneca Bluffs was identified in 1994 as one of five unique and critical habitat areas in need of protection. The site provides habitat for a wide variety of flora and fauna, and is part of a larger wildlife corridor along the river. A large diversity of migratory birds, wading birds, and waterfowl make use of the site.

With federal funding made available through the Great Lakes Restoration Initiative, the U.S. Environmental Protection Agency (USEPA) directed the U.S. Army Corps of Engineers (Corps) Buffalo District to develop and implement a plan that would restore 3,100 linear feet of riverbank along Seneca Bluffs by reducing bank erosion and improving its ecology. The Corps designed the riverbank to be resilient to future changes in water level, while avoiding excessive use of stone that would impair the land-water connectivity, to address erosion issues. The project team placed logs and root wads along the shoreline of the river to act as a cover and refuge location for fish and other aquatic life. As a subcontractor to Tidewater, Cardno provided habitat restoration

services along the river's shoreline. These services included mechanical and chemical treatments of Japanese Knotweed and Phragmites, installation of 96 pounds of native seed, 4,400 live stakes, 450 container trees, 3,400 wetland plugs, erosion control materials, and 1,500 linear feet of live fascines.



Unity Island Habitat Restoration Project

Client: USACE Buffalo District

Location: Buffalo, New York

The Unity Island Habitat Restoration Project is a joint effort between the U.S. Army Corps of Engineers and the City of Buffalo to restore approximately 10 acres of wetland and riparian habitat on Unity Island. The goal of the multi-phased project is to improve overall wildlife habitat quality on the island and to allow the free movement of fish and wildlife between the Niagara River and isolated water bodies on the island.

During Phase 1 of the project, Cardno mapped and then conducted invasive plant species control within the project area, as much of it had become overrun with non-native species. Cardno began the mechanical removal of invasive wood species in 2015 and completed it in the spring of 2018. Once the control efforts were largely concluded, Cardno commenced re-vegetation with native seed and plants in June of 2018 and will continue through Fall of 2019.

During Phase 2 of the project, Cardno re-vegetated dredge spoils materials that were excavated from the nearby Buffalo River as part of the regular navigation dredging regime and placed them within the large pond on the north end of the island. Cardno completed planting of the first test-plots in August of 2018 with full-scale restoration planting scheduled to begin in May of 2019.

Cardno is serving as a subcontractor to Tidewater, Inc. for Phase 1 of the project and to Luedtke Engineering Co under Phase 2. At the completion of the project, Cardno will have installed over 1,500 native trees and shrubs and over 26,000 wetland plants.



Lake Thonotosassa Marsh Restoration

Client: Southwest Florida Water Management District

Location: Thonotosassa, Florida

Cardno supported restoring 90 acres of wetlands in this Surface Water Improvement and Management (SWIM) project. Cardno redirected water into the restored wetlands to provide biological treatment and improve water quality in Lake Thonotosassa. Cardno assisted the SWIM Project Manager with design modifications that ensured better survival of planted species and designed and implemented a monitoring program that met SWIM objectives cost effectively.



Buffalo River Area of Concern Habitat Restoration

Client: Severson Environmental Company

Location: Buffalo, New York

The Buffalo River Area of Concern is in the midst of a multi-year cleanup effort directed by public-private-non-profit partnership comprised of the U.S. Environmental Protection Agency, U.S. Army Corps of Engineers, New York State Department of Environmental Conservation, Buffalo Niagara Riverkeeper and Honeywell that includes the implementation of habitat restoration projects that will help restore select areas of the river.

As a subcontractor to Severson Environmental Company, Cardno provided habitat restoration services throughout the project area that will provide habitat for fish and other wildlife. Project tasks included planning and implementing the installation and maintenance of more than 1,000,000 submerged and emergent aquatic plants in a dynamic urban river over a two-year period. Emergent vegetation was installed throughout a busy five-mile section near the downtown harbor. The initial habitat restoration planting was completed on time and within the original project budget despite several adjustments to the overall planting area and prolonged high-water levels.

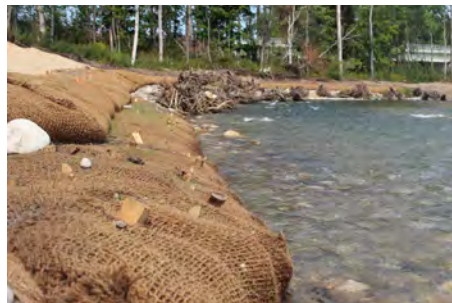


Harbor Isles Restoration Design

Client: Minto Communities, Inc.

Location: Charlotte County, Florida

Cardno assisted with designing and permitting the Harbor Isle Development in Florida, which consisted of fringing mangrove communities and a spoil island dominated by Australian pine and Brazilian pepper.



Boardman River Dam Removal

Client: Michels Corporation (Michels)

Location: Grand Traverse and Kalkaska Counties, Michigan

The nearly 300-square mile Boardman River watershed is located in Grand Traverse and Kalkaska Counties in northwest Michigan. Beginning with a planning process in 2009, the project partners decided to undertake one of the most comprehensive dam removal and restoration projects in Michigan's history and one of the largest such projects in the Great Lakes Basin.

In 2016, the U.S. Army Corp of Engineers awarded the Cass Road Dam removal to Michels Corporation

(Michels). Cardno was subcontracted by Michels to provide stream construction and native revegetation services. Cardno assisted Michels' construction team with the restoration of approximately 9,400 feet of river channel. River restoration included:

- > Installation of 43 acres of native floodplain and upland seeding
- > Construction of 4,100 linear feet of fabric encapsulated soil lifts
- > Placement of 530 large wood structures
- > Installation of 10,050 square yards of slope protection and erosion control

Of the approximately 179 miles of river and tributary streams in the Boardman system, 36 miles are designated as "Blue Ribbon" trout streams, providing premier fish habitat. The watershed is used for activities such as canoeing, hiking, hunting, and bird watching. The removal of the three dams has restored free fishery movement throughout approximately 180 miles of mainstream and tributaries. Ancillary but no less important benefits of the project include the restoration of natural large woody debris transport, mitigation of temperature regimes lethal to salmonids, and the restoration of natural stream flow function and channel form upon drawing down of the impoundments.



Ninemile Creek Post-Remediation Stream & Floodplain Restoration

Client: Confidential Client

Location: Central New York

Following sediment and soil removal, Cardno provided native revegetation and restoration services to support an extensive remediation project along Ninemile Creek.

Our team managed and implemented the complex planting plan to restore the wetland and upland vegetation along the Creek's streambanks and floodplain. The Cardno Native Plant Nursery provided plantings that included seven acres of native seed, 8,300 herbaceous plants, and 3,500 live stakes. Also planted were 9,350 locally sourced containerized trees/shrubs. To support the planting and minimize erosion, approximately 35,000 yards of erosion control materials, including erosion blankets and hydromulch, were installed. Cardno is conducting one year of maintenance and management at the site to encourage establishment.

Cardno also coordinated the restoration submittals and offered alternatives to the construction plans and field operations, assisting in obtaining New York State Department of Environmental Conservation approval on all restoration submittals. The Syracuse Section of the American Society of Civil Engineers awarded it **2015 Outstanding Civil Engineering Achievement Project of the Year.**



Sloughs Gut Salt Marsh Enhancement

Client: Delmarva Power and Light Company

Location: Delaware

A power plant's diesel fuel release damaged nearby marsh and shoreline. The Delaware Department of Natural Resources and Environmental Control, U.S. Fish and Wildlife Service, and National Oceanic and Atmospheric Administration required compensation for injuries to natural resources.

Cardno biologists and wetland scientists were involved in all aspects of the project, including the initial identification of the compensatory restoration area, the Slough's Gut Salt Marsh at the James Farm Ecological Preserve. The 24-acre salt marsh's natural water flow patterns and wildlife habitats had been disrupted by grid-ditches constructed in the 1930s for mosquito control. Cardno provided pre-restoration monitoring, planning, and design to permitting, construction oversight, inspection, and performance monitoring. To help replace the grid-ditches, we designed a network of meandering tidal creeks, mudflats, and non-tidal pools that restored natural patterns of water flow and enhanced habitat for vegetation, birds, and nekton.



Cobb County Watershed Restoration Projects

Client: USACE Mobile District and Cobb County

Location: Cobb County, Georgia

Cardno helped develop restoration alternatives for several intensely developed watersheds in Cobb County, Georgia, including the preparation of Preliminary Restoration Plans and Environmental Restoration Reports.



Lake Hancock Marsh Restoration

Client: Southwest Florida Water Management District

Location: Southwest Florida

Cardno helped plant this 610-acre mitigation project for the Florida Department of Transportation. Intended to improve water quality and wildlife habitat, the project is part of a 1,256-acre wildlife and passive recreation park adjacent to the lake. It includes 434 acres of marsh enhancement and restoration, 149 acres of forested wetland enhancement and restoration,

24 acres of upland habitat restoration, and three acres of created marsh. Cardno provided and installed approximately 500,000 herbaceous plants, 55,000 trees, and 12,300 shrubs.



Radio Tower Bay Environmental Assessment Worksheet and Feasibility Study

Client: Minnesota Land Trust

Location: St. Louis County, Minnesota

Cardno conducted a feasibility study of construction alternatives for removing wood waste from a heavily impacted bay in the St. Louis River Area of Concern (AOC) and restoring the shallow, sheltered bay wetland. Under the original scope, Cardno led the development of the Environmental Assessment Worksheet for the Minnesota Land Trust (MLT) and the Minnesota Department of Natural Resources (MNDNR). Wood waste and the sediment profile were surveyed and characterized across the entire 56-acre wetland to determine the presence and type of wood waste and soil texture and to develop material removal elevations and volumes. Cardno designed a dewatering facility for dredged material and developed a certified construction plan and other engineering documents for the construction bid package.

Cardno completed additional sediment sampling and analysis along with bench-scale testing to evaluate

the potential environmental impact to sediment removal and the potential for beneficial re-use of dredged material within the AOC. Cardno provided oversight, technical reviews, and logistical support to the MNDNR and the MLT during construction.



Connerton Mitigation Activities

Client: Terrabrook Connerton, LLC

Location: Pasco County, Florida

Cardno continues to provide numerous services for this Pasco County town-center development. To mitigate impacts of the development, the project team provided adjacent areas for hydrological restoration and mitigation of wildlife habitat. These areas are destined to become additions to the Connerton Preserve once permit criteria are met. As the project progressed, Cardno has provided environmental permitting services, which have included avoiding and minimizing impacts, wetland creation (much by transplanting mature trees for wetlands to be impacted), design of a wildlife corridor that connects the site to county-owned lands to the west, and a recreational trail and boardwalk that has won regional awards. Other services include Village Area Plan packages, wetland delineation, wetland mitigation design, scrub-jay and gopher tortoise surveys, and upland restoration planning.



Red Barn Restoration and Land Management

Client: Lykes Brothers, Inc.

Location: Glades County, Florida

Agricultural operations resulted in the drainage of a 15,000-acre site in Glades County. Severe dewatering occurred in 1,550 acres of marshes. Lykes Brothers committed to restoring this system and retained Cardno to design and implement the restoration. Site restoration included placement of structures in ditches, restoration of wetland grades, replacement of organics, and development and implementation of an extensive monitoring program. Cardno obtained surface water management permits from the South Florida WMD for ongoing agricultural operations. The result was demonstrable increases in site use by wading birds and eagles, improvement of nesting habitat for sandhill cranes, and improved habitat for alligators. An unplanned side effect of this restoration has been notable improvements in water quality at outfalls from this large agricultural property.



St. Louis River Estuary Wild Rice Restoration Implementation Plan

Client: Minnesota Department of Natural Resources

Location: Northeast Minnesota

Wild rice was once abundant in the St. Louis River estuary, providing cultural harvest opportunities and important fish and wildlife habitat. As part of the effort to restore wild rice to the estuary, Cardno was contracted by the Minnesota Department of Natural Resources (MNDNR) to lead a multi-stakeholder planning team with representatives from MNDNR, Minnesota Pollution Control Agency, Wisconsin Department of Natural Resources, the Great Lakes Indian Fish and Wildlife Commission, Fond du Lac Natural Resources, the 1854 Treaty Authority, and Minnesota Land Trust to develop a long-term plan for wild rice restoration in the estuary.

Cardno also facilitated stakeholder and project team meetings, conducted field work to fill in data gaps for restoration site selection, and developed a GIS-based spatial model to prioritize areas for wild rice restoration based on water depth, substrate characteristics, and the existing plant community. The plan will be used by Minnesota, Wisconsin, and other partners over the next 10 years to restore at least 275 acres of wild rice in a 7,300-acre portion of the 12,000-acre St. Louis River estuary.



I-69 Wetland Mitigation Project

Client: CLR Construction, Inc.

Location: Daviess, Greene, Monroe and Pike Counties, Indiana

Indiana DOT is conducting a multi-year project to construct an expanded I-69 corridor to better connect Indianapolis with Evansville, Indiana. Cardno conducted restoration and site stabilization work at 18 sites along the I-69 construction corridor across four counties. Wetlands and streams were being impacted by the project, requiring mitigation. Cardno prepared and installed native seed across 1,300 acres, provided and installed more than 450,000 bare root tree and shrub seedlings, more than 77,000 three-gallon container tree seedlings, and 66,000 live willow and cottonwood stakes. We installed over 50,000 square yards of erosion control blanket.

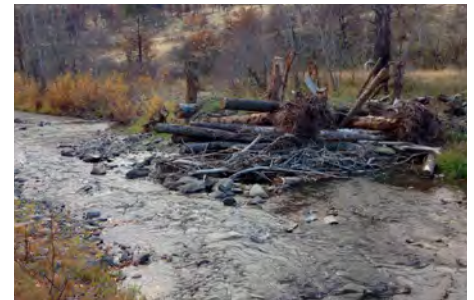


Collins Hill Park Stormwater Detention Improvements and Restoration

Client: Gwinnett County in partnership with ARCADIS

Location: Gwinnett County, Georgia

Cardno provided planning, design, and permitting services to select, design, and oversee construction of projects to improve water quality, control stormwater runoff, and improve instream habitat.



Rock Hill Borrow Pit Stream Restoration

Client: Tindle Enterprises, Inc.

Location: Walton County, Florida

In order to resolve a FDEP Consent Order, Cardno developed and implemented a restoration plan to restore an unnamed creek upstream of Bruce Creek that had been impacted by an adjacent sand mining operation. The restoration plan focused on controlling the input of sand into the creek, defining the structure of the creek, replanting native vegetation, and developing a monitoring plan. The plan balanced the most effective, unobtrusive

solution to existing conditions, and ecologically sound activities. We removed the source of sedimentation and allowed the stream to re-establish a natural structure without the mechanical removal of sediment from the creek. The sand mine was re-graded and the area of the breach was reconstructed and stabilized. Woody brush and plantings were placed in the floodplain and along the banks. Log vanes were used and floodplain structures were placed to passively anchor brush bundles. Structures were placed to facilitate the development of stable, anastomosed channels and to form the genesis point for stable “islands” of vegetation. This holistic approach allowed the stream to re-establish healthy instream and riparian communities.



Wolf Lake Aquatic Ecosystem Restoration

Client: Luedtke Engineering Company

Location: Hammond, Lake County, Indiana

Cardno supported the U.S. Army Corps of Engineers and the client’s project engineer to provide and install more than 125,000 native plants to help restore Wolf Lake, a 500-acre body of water located on the Indiana / Illinois border. Restoring the lake involved hydraulic dredging of two large open water areas and creating sand islands using the silt dredge material. The islands provide

the opportunity to restore fish and waterfowl habitat similar to pre-settlement conditions.

Cardno also provided maintenance and monitoring services for the site. The USEPA and Chicago Wilderness awarded the project the **2009 USEPA Conservation and Native Landscaping Award**.



Providence Hall Stream Restoration Monitoring

Client: Colonial Williamsburg Foundation

Location: Williamsburg, Virginia

Cardno staff has worked on the Providence Hall Stream Restoration project, located in the Historic District of Colonial Williamsburg, for the past 15 years. Cardno was part of the design team and secured permitting during the first nine years and has been monitoring it for the past six years. Restoration measures were warranted due to the highly eroded nature of the stream channel, which included installing in-stream cross vein structures, re-vegetating eroded banks, and installing upstream stormwater management facilities. Wooden pile bridges were installed to re-create an historic trail through the property. Monitoring included assessing the condition of the in-stream structures, documenting the establishment of the bankfull bench, observing any erosion, re-vegetating the stream edges, and evaluating the status of the upstream stormwater

management and any proposed corrective measures.



Oak Meadows Golf Course Flood Control and Restoration

Client: Martam Construction

Location: DuPage County, Illinois

Cardno is providing restoration services as part of a flood control project, led by Martam Construction, at the almost century-old Oak Meadows Golf Course for the Forest Preserve District of DuPage County. Flooding has repeatedly damaged the existing golf course. Reducing the course’s holes from 27 to 18 will help restore Salt Creek where hydrology, reintroduced to the adjacent areas, will create 24.6 acres of new wetland, 107 acres of new natural area restoration, and an additional 35 acre-feet of floodplain storage. Cardno’s services include installing 327,000 square yards of erosion control blanket, 392,000 wetland plantings, 115 acres of native seeding, and five years of ecological maintenance and monitoring. This project has required longer-than-average lead times for plant growth since plant genotypes are required to be within 100 miles and in large quantities. The project will help manage flood control for the area, creating a natural preserve with bike and walking trails within the new flood resistant golf course, enhancing water quality and ecology along the Salt Creek.



Lake Lochlossa Gopher Tortoise Mitigation Bank

Client: Plum Creek Timber Company

Location: Alachua County, Florida

Cardno established and manages the Lake Lochlossa gopher tortoise recipient site. Cardno obtained approvals to use the suitable upland habitat on the site as a multiple-project gopher tortoise recipient site. The entire project boundary encompasses 16,000 acres of potential listed species habitat. The first phase of the mitigation project covers 600 acres and can accept approximately 1,700 additional gopher tortoises from on-site and off-site projects. Cardno also prepared and implemented a long-term holistic land management plan that focused on improving the habitat for gopher tortoises and increasing the amount of gopher tortoises that can be relocated to the property. Other faunal species benefiting from this project include Southeastern American kestrel, Florida sandhill crane, Sherman's fox squirrel, wading birds, Florida mouse, Eastern indigo snake, and gopher frogs.



Boarshead Ranch Mitigation Bank

Client: WRB Enterprises, Inc.

Location: Pasco County, Florida

The Boarshead Ranch Mitigation Bank is a 2,000-acre wetlands mitigation bank project located at the convergence of the Withlacoochee and Hillsborough Rivers in southeast Pasco County, Florida. The project involves the preservation, enhancement, restoration and creation of wetland habitats and the preservation and enhancement of upland habitats on an existing ranch. Once completed, this mitigation bank will add approximately 2,000 acres of native buffer surrounding the rivers and will be one of the few wildlife corridors in the state expansive enough to support the movement of large predators such as the Florida black bear and Florida panther.



Onondaga Lake Restoration

Client: Parsons Engineering of New York, Inc.

Location: Syracuse, New York

Cardno assisted with designing and restoring 35 acres of in-lake wetland habitat along 1.2 miles of shoreline of Onondaga Lake in Syracuse, NY. The wetlands are being constructed on top of an in-lake multilayer isolation cap. More than 250,000 plants and 2,500 pounds of seed will be installed from more than 100 native species. Establishing wetlands along the shore of a moderate-sized lake presents challenges not normally experienced in most inland settings. Wave attenuation measures, protective plant enclosures, and overall planting design are helping to mitigate expected challenges.

About Cardno

Cardno is a professional services company, offering a wide range of integrated environmental, engineering, infrastructure, scientific consulting, and field services to provide the expertise and operational efficiencies that support public and private sector clients.

Local expertise across the Americas and around the world

Our team of experienced professionals provide clients with best-in-class environmental, infrastructure, and scientific solutions from more than 100 offices across the Americas.

In addition to local expertise, our global professionals collaborate to share diverse knowledge and perspectives that allow us to provide innovative and sustainable solutions that deliver lasting value.

Our offices across the Americas are strategically located to make it easy for our team to get to your facilities and sites. We pride ourselves on following clear communications paths, careful quality assurance procedures, and disciplined safety processes. Together, with our local knowledge, we excel in providing exceptional solutions as we plan, design, and manage your project.

Industry recognition

By working with new clients every day and expanding relationships with our existing clients, we have become a recognized leader within the industry. In recent years, Cardno has continually ranked in multiple categories as a Top firm in *Engineering News-Record's* annual lists.

We are leaders in delivering scientific and sustainable environmental solutions for our clients. We work to restore the physical and natural environment, improve ecological and human health, and positively impact the lives of our employees and our communities.

Our company's core values – safety, integrity, people, and excellence – reflect this vision. Within Cardno, staff and the work we perform center around a commitment at all times to working safely, with integrity and excellence, and a caring spirit for our people, our teams, and our communities.

SAFETY

INTEGRITY

PEOPLE

EXCELLENCE

As a global organization of talented people, we are united by one purpose and that is Making a difference, for our people, our clients, and for the communities in which we live and work.

Making a difference.

About Cardno

Cardno is a professional infrastructure and environmental services company, with expertise in the development and improvement of physical and social infrastructure for communities around the world. Cardno's team includes leading professionals who plan, design, manage and deliver sustainable projects and community programs. Cardno is an international company listed on the Australian Securities Exchange [ASX:CDD].

Cardno Zero Harm



Cardno is committed to a rigorous approach to safety in all our operations. Cardno Zero Harm – Every Job. Every Day means conducting our business in a way that protects our people, clients, visitors and members of the public from harm, and promotes our commitment to environmental

responsibility. We are committed to achieving our 'Zero Harm' goal by continually improving our safety systems and vigilance at our workplaces through strong leadership, employee participation and practical action.