



Statement of Corporate Qualifications

*Science Collaborating with Business for
Better Environmental Solutions*



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COMPANY PROFILE

The WHM Group_{SM} is a multi-discipline company committed to delivering environmental resource solutions. WHM is proud of its record in solving environmental problems.

The WHM Group_{SM} – along with its wholly owned subsidiaries, **WHM Consulting, Inc.** and **WHM Solutions, Inc.** – emerged from the successful business experiences of Wetlands Habitat Management, Inc. The WHM family of companies offers comprehensive resolutions to difficult environmental problems.

Founded in 1996 Wetlands Habitat Management provided third-party professional support to clients dealing with complex wetland, stream and other highly regulated environmental issues.

Both companies in the new family are owned by the founders and certain senior employees with an expertise that extends far beyond water resources. All owners are professionals with backgrounds in government and government relations, environmental permitting, environmental engineering, the natural sciences, construction, hydrology, business development in the United States and abroad, as well as economic development, marketing and project management.

The WHM Group_{SM} provides the overall business and science guidance for WHM Consulting and WHM Solutions. The Group follows a carefully balanced strategy emphasizing a collaboration of good environmental science and sound business practices in providing cost-effective solutions and services for clients.

WHM Solutions, Inc. offers turnkey packages at an attractive fixed price to provide our clients with the most cost effective and technically sound projects. From conceptual planning and permitting to task implementation, The WHM Group_{SM} provides a total package and a high degree of confidence of project success.

WHM Consulting, Inc. provides support for a wide array of business and environmental interests. We have a proven record of expertise and success in wetland determinations and delineations; biological surveys, studies and assessments for threatened and endangered species; complete environmental permitting for large, complex projects; ground-water and surface-water quality studies; site assessments and remediations.

THE WHM ADVANTAGE

PERFORMANCE

A Comprehensive Resource...

WHM approaches environmental problems with a business strategy that maintains a balance between private sector resources and public regulations. **WHM** believes that environmental impacts offer business opportunities for the private sector while at the same time presenting solutions which strengthen the quality and integrity of our natural resources. There is no need to seek out experts for each step of the process.

Expertise...

The Directors of **WHM** have all been involved with important corporate projects of all sizes since the mid-1970s. The Directors have also been active with many local, state and federal governmental activities for the same period of time. Because of this unique experience, **WHM** brings a competitive advantage in assisting business and government to solve environmental problems.

Operational Business Excellence...

Because **WHM**, through its operating affiliate, has considerable practical experience in providing environmental solutions for government and private interests, the Company offers unique insight and approach to its projects which are not available through other parties.

Confidentiality...

WHM assures confidentiality in all of its activities.

SERVICE SUMMARY

The WHM team services client needs for a multitude of timely environmental issues. We are proud of our long history of providing a complete range of environmental and engineering consulting services from the early stages of planning and defining project objectives to the implementing stages of construction management, inspection and certification. The WHM team's comprehensive expertise is broadly separated into the following categories:

ENERGY DEVELOPMENT

Nearly all projects require a comprehensive review of sustainability and environmental impacts to the air, water and the natural environment. Such analyses of these natural resources require teams of personnel with strong science expertise in multiple disciplines. WHM has worked on many projects to evaluate and to mitigate impacts to our natural resources. Armed with project evaluations, we engineer the design to minimize impacts both during construction and for the long term. Erosion control, stormwater management, water quality monitoring, groundwater and soils remediation and visual impact studies are just a few of the evaluations performed by WHM for projects as diverse as wind farms and stream restoration.

The Marcellus Shale holds trillions of cubic feet of natural gas. Now accessible due to advances in geologic exploration and drilling technologies, the Play has attracted great interest and investment in developing the formation. WHM has the experience to assist with the planning, design and permitting associated with each aspect of well development including water storage, management of drilling wastes, and environmental investigation. Our environmental scientists and engineers find creative solutions to erosion and sediment pollution, abandoned mine drainage, as well as stormwater and sewage discharges, using a balanced, well-structured approach.

Wetlands banking and advanced compensation are two of our creative solutions to complex wetlands issues. Our staff of environmental specialists, soil scientists and engineers provides full service, securing permits for mitigation and delineating, designing and monitoring the construction of wetlands projects. WHM has resolved many client frustrations through negotiations with regulators and by using a common-sense approach.

Energy will remain high on the nation's list of priorities for many years, and this is a key area of our practice. As the nation searches for new sources, we offer:

- Strategic Planning
- Site Assessments and Development
- Risk Management
- Biogas
- Wind to Energy
- Carbon Credits
- Solar
- Government Relations
- Uniting Partners and Clients
- Well Pads
- Pipelines
- Water Impoundments
- PPC and Water Management Plans
- Well Plat Preparation
- Site Layout/ Planning
- Construction Stakeout, Observation, E&S Inspection
- Water Withdrawal and Transfer Station Design

PERMITTING

WHM coordinates with regulatory agencies on a variety of environmental projects and provides expert assistance with obtaining all necessary permits and completing designs to complete your project.

- National Pollutant Discharge Elimination System (NPDES) Design and Permitting
- Soil Erosion and Sediment Control (ESCGP and ESCGP1 Permitting)
- Post Construction Stormwater Management.
- Water Obstruction and Encroachment
- General Permitting
- Air Quality Permits
- Water Quality Permits
- Stormwater Discharge Permitting
- Waste Management Permitting
- Pennsylvania Act 2
- Abandoned Mine Reclamation
- Oil and Gas
- Chapter 105 Permitting
- Highway Occupancy Permitting

NATURAL RESOURCES MANAGEMENT

We provide restoration, protection and conservation in areas of air, water, soils, agronomy, geology and hydrogeology, as well as the development of appropriate use of natural resources such as natural gas and industrial minerals. This includes management of wetlands and watercourse issues including accurate boundary determination, property acquisition for development mitigation, computer-aided conceptual wetland and stream restoration design.

Additionally, we work with jurisdictional agencies for the management of threatened and species issues including habitat assessments, presence/absence surveys, research, habitat management plans, and construction monitoring.

- Threatened and Endangered Species
- Wildlife Management
- Wildlife Habitat Creation/Enhancement
- Biological and Ecological Assessments
- Macroinvertebrate Surveys
- Radio Telemetry
- Soil Evaluations
- Wetland Delineations, Mitigation, and Treatment
- Archeology
- Watershed Assessments, Restoration, and Protection Plans
- Stormwater Management
- Natural Channel Design
- Water Quality
- Hydrological/Geological Studies
- On-lot Waste Water Management
- Coal/Natural Gas
- Nutrient Credits
- Stormwater Infiltration Testing
- Geotechnical Studies
- Surface Mining
- Soil and Groundwater Remediation
- Forest and Habitat Management

SITE DESIGN MODELING AND MAPPING TECHNOLOGIES

WHM has developed visual aids to help regulators and the public understand the scope and visual impact of a project through design and site location mapping, in addition to 3D project visualization. Additionally, hydrology and hydraulic design softwares can be used to design appropriately sized infrastructure. These software tools help clients for planning, managing, and decision making. Below are some of the commonly used software packages.

Mapping Software

- AutoCAD Civil 3D 2011 – Used for grading design
- AutoCAD Land Desktop 2004– Used for grading design
- ArcGIS – Used for a variety of mapping and analyses
- Trimble Terrasync – Used on the GeoXH GPS Unit
- Trimble GPS Pathfinder Office – Used for the GeoXH GPS Unit
- Visual Nature Studio – Used for 3d Video Animation utilizing GIS data.

Hydraulic Design Software

- HY-8 – Used for road overtopping for design work
- VT/PSUHM – Determine flows for pipes and channels.
- HEC-RAS - Used to model water flow

Hydrologic Design Software

- TR-55 Software – Used for smaller watershed runoff calculations.
- USGS-WRIR – Used for larger watershed runoff calculations.
- PSU-IV - Used for larger watershed runoff calculations

WASTE MANAGEMENT

We have demonstrated innovation in nearly all sectors of waste management, including liner technology, leachate management, bioreactors and landfill gas utilization. Our personnel are skilled at the art of balancing environmental considerations with economics and potential liability.

- Brine Water Treatment & Disposal
- Landfill Disposal
- Permitting & Planning Services
- Regulatory Coordination
- Environmental Remediation
- Emergency Response
- Beneficial Use Projects
- Hazardous Waste Collection
- Construction Management
- Quality Assurance
- Soils and Geosynthetic Materials
- Spill Prevention & Management
- Hazardous Waste Treatment
- Hazardous Waste Recovery
- Reclamation
- Operation
- Closure
- Monitoring
- Post Closure
- Impoundments

PERMITTING

WHM has over 15 years of experience related environmental permitting with the local, state and federal regulations related to development. These experiences come from a variety of cliental, including landfills, energy transmission, energy production, transportation, and any other development related projects. When earth disturbance is to occur, our staff has produced numerous SESC, PCSM, Water Obstruction and Encroachment Permits, and other environmental permits related to the earth disturbance.

DEPARTMENT OF ENVIRONMENTAL PROTECTION



Your state's Department of Environmental Protection regulates air quality, water quality, acid mine drainage, flood protection, hazardous-waste sites, alternative fuels programs, oil and gas wells, brownfield redevelopment, erosion control, municipal waste and landfills, storage tanks and dozens of other things. Obtaining all necessary permits can be nearly impossible without expert assistance.

The Pennsylvania Department of Environmental Protection (PaDEP) has included WHM on a select list of engineers qualified state-wide to assist consultants, developers, and construction firms in preparing quality erosion control, stormwater management plans, and NPDES permit applications across the Commonwealth. Most importantly, this program allows for an expedited review and approval process that is 30 days, not including the public comment period (30 days) for Individual NPDES permit applications.

The Scope of Work for these projects could include any or all of the following:

- Facilitate Pre-Application Meetings with PaDEP;
- Assist in securing local permits from municipalities and counties;
- Prepare NPDES permit application forms;
- Oversee/Review Soil Erosion & Sediment Pollution Control (SESC), Stormwater and Post-Construction Stormwater Management Plans (PCSM);
- Review Proposed Site Construction Sequence;
- Develop Construction Quality Assurance Plan for site development;
- Develop Operation & Maintenance Plans for SESC and PCSM facilities; and
- Provide "Letter of Endorsement" to include with permit applications to facilitate expedited review process.

As with any project, working with the permitting agencies involves lots of communication with the regulators in order to provide the clearest and most accurate project information for the necessary, desired permits. WHM has a strong working relationship with the regulatory agencies and their staff throughout the region. These good standing, professional relationships with regulators gives our companies a local advantage by knowing the right people to talk to when it comes to project permitting. Project permit turn-around times vary based on a variety of criteria, including project size, number of regulatory agencies involved, and environmental impacts (i.e. threatened/endangered species, State Forest Lands, etc.) resulting from the project, to name a few. A SESC/PCSM plan turnaround ranges from one month to one year, once again, from the time the project is initiated through the permit approval.

NATURAL RESOURCE MANAGEMENT

Wetlands, streams, species of special concern, and public lands are typically protected by federal and or state regulations. The surveys and resource agency review process often takes up to several months to complete. WHM's scientific staff works closely with the client and project engineers to conduct early project scoping and investigations during the development phase in an effort to avoid and minimize regulated impacts and to identify permitting issues. WHM's strong knowledge of permitting conditions allows for the development of potential avoidance and minimization options that could improve the permit approval process and ensure maintenance of project schedule. Options are typically assessed in the field for efficiency and cost savings purposes.

WHM scientists have strong coordination relationships with state and federal resource agency representatives with jurisdiction within the shale play. WHM has achieved successful outcomes for the oil and gas industry projects and other development projects related to the following issues: state and federal stream and wetland encroachment permitting, threatened and endangered species assessments/survey clearances, public land coordination and access and special condition approvals.

THE PNDI PROCESS

In recent times, regulatory agencies, municipalities and corporations have become increasingly concerned about ecological issues. The investigation and appropriate identification of biological and natural resources are the foundation of any ecological project. WHM personnel have the knowledge, skills, and experience to identify any area's flora and fauna. Regardless of whether the project requires a one-day site assessment or a long-term advanced research study involving a complete biological inventory, WHM has the ability to prepare an ecological or biological evaluation plan that meets the project's needs and provides a feasible solution.

The Pennsylvania Department of Conservation and Natural Resources describes PNDI in the following manner:

The Pennsylvania Natural Diversity Inventory (PNDI) is a partnership between the Pennsylvania Bureau of Forestry, the Nature Conservancy, and the Western Pennsylvania Conservancy to conduct inventories and to collect data to describe the Commonwealth's rarest and most significant ecological features. These features include plant and animal species of special concern, rare and exemplary natural communities and outstanding geologic features. Site-specific information describing these features is stored in an integrated data management system created from map, manual, and computer files. The PNDI information system is continually refined and updated to include recently discovered locations and to describe environmental changes affecting known sites. The goal is to build, maintain and provide accurate and accessible ecological information needed for conservation, development planning and natural resource management. <http://www.naturalheritage.state.pa.us/>

WHM believes that through advanced planning and minor modifications to development plans, it is feasible to work with PNDI and developers to prevent losses of biological diversity without consequence to the economy.

WETLANDS

- Delineations
- Mitigation
- Design
- Regulatory Approval
- Construction



DELINEATIONS

During the initiation of any project, it is wise to have your site evaluated for wetlands. Avoiding this step can be costly, time consuming and may inhibit the development of the project. WHM has experienced professionals who can determine whether jurisdictional wetlands and waters exist within your project location.

Wetlands are those areas on the landscape that experience saturation or ponding for at least 5% of the growing season, contain plants that are tolerant to periods of saturated conditions, and display evidence of hydric soils. These areas are subject to varying local, state and federal regulations.

WHM utilizes the most up-to-date technical methods to delineate wetland boundaries and prepare technical data and mapping for your project. Additionally, our professionals will provide recommendations to avoid and minimize water resource impacts in order to achieve your goals.

MITIGATION

We have developed successful wetland mitigation sites throughout Pennsylvania. We carefully select properties suitable for wetland development by utilizing the most up-to-date Geographic Information Systems databases and software. Potential sites are identified through an examination of hydrology, soils and the probability of being a wetland historically. Selecting the best mitigation site translates into a high probability of success using less construction effort. Selection of the best mitigation site is well worth the effort to save substantial funds. Our view, refreshingly different from most others is to examine the lifecycle costs of the mitigation site.

WHM maintains and controls off parcels throughout the gas production and pipeline regions of Pennsylvania exclusively for mitigation purposes. These sites generally fall into watershed areas informally pre-approved by permitting agencies to be used for offsite stream, wetland and habitat mitigation. WHM also coordinates with various sporting groups (turkey, deer, fishing, and overall outdoor sports groups) for the design, feed stock, and special features so as to enhance wildlife, its feedstock and enhance water quality. Importantly, WHM also holds portions of farm sites for mitigation. Farmers are increasingly realizing the nutrient and livestock management value exchanges between WHM and the gas producers and pipeline mitigation requirements.

DESIGN

Once a suitable site has been determined, WHM will create a conceptual design based on the overall shape of the landscape and the development of a hydrological water budget. Through computer-aided design, construction drawings are then developed. The final design illustrates phased construction activities, erosion-control practices and a complete planting and re-vegetation schedule.

REGULATORY APPROVAL

WHM has both secured mitigation regulatory permits in our name and secured permits in the client's name. WHM works closely with both the Army Corps of Engineers and the state level Environmental Regulatory Agencies in pre-qualifying sites and permits.

Often the regulatory agencies provide technical advice and describe the preferred replacement outcomes. The aftercare, maintenance, and monitoring, are on-going responsibilities of WHM and associated costs are built into the pricing. Typically our clients prefer not to hold long term monitoring responsibilities.

CONSTRUCTION

WHM is able to provide wetland mitigation as a turnkey project with a full list of services, including GIS property searches, on-site resource evaluations for potential wetland mitigation, permitting from the state and U.S. Army Corps of Engineers, construction, construction management and professional engineering certification, preparation of bid documents and project specifications, and wetland monitoring and maintenance.

SYSTEMIC SOLUTIONS

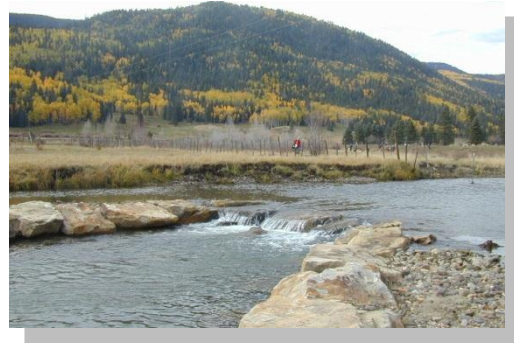
Federal and State Regulatory Agencies prefer the avoidance of environmental impacts to sensitive environmental areas. WHM first practices avoiding, given reasonable costs and time, such pristine areas for its clients. Once the regulatory agencies are convinced such avoidance has been practiced, then assembling, fewer but larger environmental projects gain an expedient regulatory approval. Consolidating larger impact solutions become less expensive and less time consuming.

WHM has a rich history of avoiding costly small solutions and then consolidating into a single project. WHM has a successful business history of managing high value environmental solutions. The Company provides environmental solutions - planning, permitting, construction and after care – on a fixed price business approach allowing the client to rely on outsourcing as a better business methodology.

The highest value, fixed priced solution for WHM clients in the Marcellus Gas Play (producers and midstream companies) are WHM system-wide, or Systemic Solutions. With the many impacts due to pads, roads, impoundments and pipelines there is the need to plan, coordinate and consolidate the approach toward mitigation and minimization. Appropriate consolidation of system wide impact solutions expedites regulatory approval and, generally results in downward pressure on price. Through this approach WHM delivers expediency and price predictability.

STREAMS

- Restoration
- Natural Channel Design
- Abandoned Mine Drainage
- Water Quality
- Assessments



RESTORATION

Stream channels that are impaired can become unstable and cause damage to infrastructure such as roads, bridges and houses. In addition, unstable streams can produce high sediment loads that impact aquatic habitat and stability of downstream reaches.

WHM has assessed hundreds of miles of streams to determine "pinch points" that affect channel stability. Bank erosion surveys determine the rate of channel movement and sediment production, leading to the development of plans to remediate the problems.

We also have expertise in riparian zones – the transitional areas between land and water environments. For many streams, there is little or no riparian zone, due to clearing, paving or neglect. This may result in increased flooding and erosion, and may cause property damage. The establishment of the riparian zone of streams and wetlands is vital to the health of water resources. The vegetation of the riparian zone provides habitat, streambank protection, shading and filtering of stormwater runoff. WHM evaluates riparian vegetation and provides solutions to improve or restore these vital areas.

Stream restoration includes returning a stream, its floodplain and riparian area to its natural and stable condition, as well as re-establishing its biological habitat and function.

NATURAL CHANNEL DESIGN

Today, many stream channels are impaired due to development, sprawl and agricultural practices. It is important to restore impaired waterways not only for water quality, recreation and aesthetics, but also because streams provide habitat for complex ecosystems and are critical to the overall health of any watershed.

Natural channel design is a method of restoring or creating a stable stream channel by using a natural system as a model. WHM has successfully designed stream restoration projects using these methods in Pennsylvania, New York, Maryland, North Carolina and West Virginia. We offer full-service solutions: background data collection, design, permitting and construction.

ABANDONED MINE DRAINAGE

Constructed wetlands provide a cost-effective and long-term alternative solution for the treatment of acid mine drainage, stormwater and various industrial wastewaters. WHM has designed and developed wetlands that utilize naturally occurring chemical and biological processes to remove contaminants prior to entering the watershed. This cutting-edge technology is typically developed through the design and construction of a series of aerobic and anaerobic wetlands. WHM has been successful in providing our clients with passive treatment systems that meet effluent discharge limits and treatment goals.

Passive wetland treatment also can be utilized to gain credits in nutrient management programs, such as the Chesapeake Bay Strategy.

WATER QUALITY

Pollution degrades surface waters making them unsafe for drinking, fishing, swimming, and other activities. We have experienced staff that specializes in the evaluation of water resources. The intention of a watershed assessment is to collect data that characterize the health of the watershed. The assessment results will identify areas that are impaired or areas that have valuable resources. This information can then be used for planning, obtaining grants, preservation and restoration. Typically, the watershed assessment is the initial phase of planning to prioritize stream improvement projects.

Through our strategic relationship with our associate ESG, we are able to pursue grant assistance through state and federal programs.

ASSESSMENTS

Geomorphic stream classification is a system of defining streams based on morphological characteristics and functions. With our staff specializing in fluvial geomorphology, WHM is able to provide stream channel classifications as a useful tool for identifying areas of impairment and to predict future stream problems before they occur.

ECOLOGICAL

- Threatened and Endangered Species
- Biological Assessments
- Ecological Assessments
- Macroinvertebrate Surveys
- Wildlife Management
- Radio Telemetry
- Wildlife Habitat Creation/Enhancement

THREATENED AND ENDANGERED SPECIES



Issues of threatened and endangered species often arise during the planning review by county conservation districts, the Pennsylvania Department of Environmental Protection, the Department of Conservation and Natural Resources, the Pennsylvania Fish & Boat Commission and the U.S. Fish & Wildlife Service. If a database reveals that such species may be present in or within close proximity of the project area, the permit applicant is required to retain a qualified biologist to investigate the area.

Early consultation with jurisdictional agencies prior to project development is critical. **WHM** and our associates have certified professionals to deal with "hits."

The *bog turtle*, the *red-bellied turtle*, the *timber rattlesnake*, the *eastern massasauga rattlesnake*, the *Indiana bat*, the *green salamander*, the *bald eagle*, the *Allegheny woodrat*, and the *northeastern bulrush* are among a group of species that generate concern in Pennsylvania and in some neighboring states. **WHM** staff and associates include personnel that are recognized by State and Federal agencies as qualified surveyors/biologists for the above mentioned species.

WHM staff and associates have conducted numerous habitat assessments and presence/absence surveys for many plant and animal species of concern for various developers, engineering firms, non-profit organizations, universities, and government agencies in:

Pennsylvania	Maryland	Florida	South Carolina
New Jersey	Virginia	Florida Keys	Georgia
New York	Ohio	Alaska	Upper Mid West
Delaware	New England	California	North Carolina

These studies allowed projects to go forward without negatively impacting the habitats of threatened and endangered species.

The expertise and experience of our staff and associates includes, but is not limited to other species such as: *the wood turtle, map turtles, spotted turtles, box turtles, canebrake rattlesnake, eastern hognose snake, corn snake, northern pine snake, northern copperhead, eastern fence lizard, five-lined skink, pine barrens tree frog, eastern spadefoot toad, western spadefoot toad, green salamander, Jefferson salamanders, marbled salamander, spotted salamanders, American alligator, American crocodile, spectacled caiman, Aleutian canada goose, red-headed woodpeckers, semi-palmated sandpipers, upland sandpiper, piping plovers, loggerhead shrike, burrowing owl, barred owls, grasshopper sparrow, black crowned night heron, American bittern, bobolink, eastern small footed bat, northern myotis bat, many species of freshwater mussels, Stephen's kangaroo rat, coronet blue butterfly, edith's checkerspot butterfly, damselflies, dragonflies, eared false foxglove, swamp honeysuckle, swamp pink, Hartford fern, pitcher plants, sundews, and broom crowberry.*

BIOLOGICAL/ECOLOGICAL ASSESSMENTS



Biological and ecological assessments are generally an inventory of all plant and animal life within an assigned area, and the overall environmental quality of that area relating abiotic factors (temperature, light, moisture) to biotic components, the living things that shape an ecosystem.

MACROINVERTEBRATE SURVEYS



The condition of aquatic habitat is an indicator of the overall health of a watershed. **WHM** has experienced staff that can perform aquatic habitat assessments, including macroinvertebrate surveys, and is familiar with leading assessment protocols required in Pennsylvania and elsewhere.

WILDLIFE MANAGEMENT



We have expertise/experience in environmental impact statements, surveys and technical reports for many species of threatened and endangered plants and wildlife, natural resource/biological inventories, herptile inventories and surveys, construction monitoring services for threatened and endangered species, vernal pool surveys and evaluations, drift fence trapping for threatened and endangered species, and bog turtle trapping.

RADIO TELEMTRY



Radio telemetry is a mechanism used by biologists to track wildlife in the field, usually for the purpose of obtaining activity range and daily movement data, as well as habitat use. Radio transmitters can be safely attached to wildlife through a variety of procedures depending on the species. The data can be used to develop an appropriate wildlife management or habitat management plan. An example would be

habitat management at a known bog turtle site. Particular portions of wetlands where bog turtles are known to occur may be managed differently based on the activity range and habitat use data provided through radio telemetry.

WILDLIFE HABITAT CREATION/ENHANCEMENT



Habitat creation involves the construction of appropriate habitat for a given wildlife or plant species through activities such as prescribed burning, exotic/invasive vegetation removal, vernal pool construction, waterway enhancement, and introduction of native vegetation.

FOREST AND HABITAT MANAGEMENT

- Forest and Habitat Management Plan Development and Implementation
- Forest Inventory and valuation
- Design, layout and administration of timber harvests and silvicultural applications
- Timber and timberland appraisal and due diligence
- Wildlife food plot design and construction
- Low impact timber harvests and timber stand improvements
- Invasive plant species control and herbicide applications
- Erosion and sedimentation management
- Conservation easement and forestland protection consulting
- Due diligence and divestment services
- Property Boundary location and maintenance

FOREST AND HABITAT MANAGEMENT PLAN DEVELOPMENT/IMPLEMENTATION



At WHM, timberland management begins with defining the owner's objectives. We strive to reach a thorough understanding and agreement with the landowner on the purpose, time horizon and desired intensity of management for the property. The initial evaluation determines the emphasis, and thereby the resources, to be dedicated towards wildlife habitat enhancement, habitat management, habitat conservation, timber production, recreation, historic preservation, or other considerations. A

subsequent on-the-ground assessment of the attributes of the property can then be used to develop a comprehensive management plan detailing future operations and their costs and benefits.

FOREST INVENTORY AND VALUATION

Our experienced and knowledgeable specialists are actively engaged in forest inventory projects ranging from timber cruising to forest planning models. Some of the inventory services include: Timberland Valuation, Data Collection, Data Management, and Data Analysis, Growth and Yield Simulation, and Forest Planning Models. The scope and scale of these services are tailored to provide the necessary information that meets our client's needs in a cost effective manner.

DESIGN, LAYOUT AND ADMINISTRATION OF TIMBER HARVESTS AND SILVICULTURAL APPLICATIONS



Many stewardship plans will recommend a timber harvest at some point. Whether it be a timber stand improvement harvest, a thinning, or a sustainable harvest of crop trees, WHM administers the sale from beginning to end. We work with the landowner throughout the process to ensure the landowner's objectives are being met. Services include: timber sale design and layout, tree marking, marketing of timber sales, and timber sale administration. Loggers are

evaluated to ensure that the operator is properly trained, has the right equipment, is well recommended, and is sensitive to the objectives of the landowner. We will monitor the operation from beginning to end to ensure that the terms of the contract are being met.

TIMBER AND TIMBERLAND APPRAISAL AND DUE DILIGENCE



We have the capability of completing each stage or phase of a timber or timberland appraisal in-house. WHM staff can design the specifications and layout of the field inventory to be done, at which point our forester and forest technicians can quickly and efficiently collect the necessary field data required. We would then compile and report the timber and other related data, collect supporting information, analyze the data, form conclusions of value, then prepare the report to meet client specifications.

Whether for investment due diligence needs, collateral valuation requirements, estate settlement purposes, general planning and budgeting purposes, or estimating the market value of your property for prospective sale purposes, WHM can provide you with the professional appraisal services you need.

LOW IMPACT TIMBER HARVESTS AND TIMBER STAND IMPROVEMENTS



Oftentimes WHM sees, landowners saving their timber stands for future harvesting without utilizing any thinning techniques to generate substantial, healthy growth. In most cases, the trees have no means to mature and grow efficiently.

By removing poor-quality trees and leaving a substantial stand of healthy, quality trees, the remaining trees are able to grow more quickly and with better form, increasing habitat and wildlife.

Low impact timber harvesting is done to minimize the impact on the other trees in the stand.

INVASIVE PLANT SPECIES CONTROL AND HERBICIDE APPLICATIONS



Invasive species can impact the values for which land is conserved. Natural lands are not fully protected unless they also are managed for the features that first motivated preservation. Invasive species can change community structure, composition, and ecosystem processes on these lands in ways that may not be anticipated or desirable. Careful management can minimize these negative impacts.

EROSION AND SEDIMENTATION MANAGEMENT



Pennsylvania's erosion & sediment (E&S) Control and stormwater management regulations have existed since 1972. However, these rules have recently changed. All farms must have a written plan to reduce erosion from tillage, areas along streams, and animal heavy use areas (AHUAs) disturbing more than 5,000 square feet. (This includes no-till farming and areas lacking vegetation.) Best management practices (BMPs) must be implemented to control soil runoff.

CONSERVATION EASEMENT AND FORESTLAND PROTECTION CONSULTING

Landowners wishing to perpetuate the natural qualities of their land and their legacy of sound stewardship can take advantage of market mechanisms such as conservation easements to meet their conservation goals and possibly limit their tax burden. Such agreements are usually held by a non-governmental organization or government conservation agencies and vary as to their restrictions as well as their financial benefit. WHM has experience working with easement holders as well as landowners and can help guide you in every step of the often complicated process ensuring outcomes that meet your goals and protect your interest.

DUE DILIGENCE AND DIVESTMENT SERVICES

WHM advises and consults on a wide range of acquisitions services, and actively participates in transaction due diligence and research projects associated with acquisition transactions. We assist in documenting and supporting transactional work, forecasting, competition issues, regional material flows, on data collection, and verification projects.

SITE DESIGN MODELING AND MAPPING TECHNOLOGIES

- Mapping
- Surveying
- Land Analysis
- Project Planning

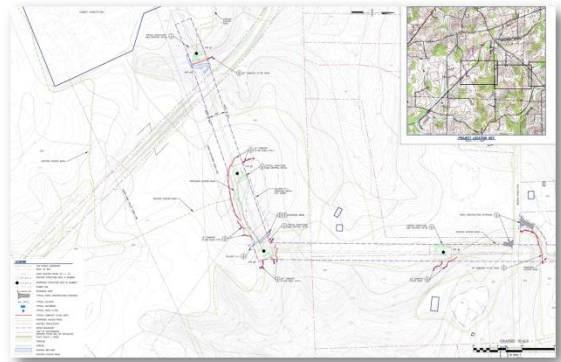
MAPPING

A geographic information system (GIS) is most often associated with a map. A map, however, is only one way we work with geographic data. A geographic information system holds great problem-solving capabilities, integrating hardware, software and data. GIS improves the speed and accuracy with which you uncover trends and patterns hidden in your data. We've employed GIS in stream channel and wetland design, wind resource analysis, topographic mapping and other areas.



SURVEYING

Our staff uses data acquired by our team using GPS technology, as well as data that's available through spatial databases. By integrating these services, as well as computer-aided design, our firm has had great success determining the suitability of a site for a specific project. The products we generate fulfill our clients' needs in planning, managing and decision-making.



LAND ANALYSIS

WHM helps you answer questions and solve problems by looking at your data in a way that is quickly understood and easily shared. We've assisted numerous clients with analysis using the most up-to-date technology and data. Our staff can help you visualize spatial relationships and determine environmental concerns.

PROJECT PLANNING

Our geographic information system team helps you succeed, using less construction effort and saving substantial funds through our efficient and effective use of technology. We've used this technology to assist our clients with site selection, property acquisition, environmental management, project planning and development, and feasibility studies for a wide range of projects.

WASTE MANAGEMENT

Managing waste in concert with natural resources becomes increasingly difficult as existing disposal facilities approach capacity and available land resources diminish. WHM's engineers and scientists have successfully addressed waste disposal issues involving solid and hazardous waste disposal for over 25 years. We work closely with municipalities, industries, and waste authorities to incorporate emerging technologies with established practices to maximize site efficiency, minimize waste generation, and remediate impacted areas.

WASTE/IMPOUNDMENT ENGINEERING:

- Liner system analysis and selection
 - Geosynthetics
 - Composite
 - Subbase
 - Attenuating base
 - Inward gradient
- Leak detection management and recirculation
- Gas management
- Post-construction plans
- Construction quality assurance inspection and testing



WASTE COMPLIANCE:

- Regulatory permitting
- Compliance
- Reporting
- Residual waste management
- Harms/Benefits Analysis
- Monitoring and Data Management
- Annual Operations Reports
- Beneficial Use and Source Reduction
- Post-Closure Inspections
- Post-Closure Land Use and Redevelopment

OTHER

- Grant Writing
- Construction Oversight/Monitoring
- Nutrient Trading

GRANT WRITING

WHM has the background and knowledge to assist non-profit organizations with grant writing to pursue funding from private, state and federal sources for various projects desired by the organization. We have high success rate for receiving funding for the organizations, especially through Growing Greener which is the largest single investment of state funds in Pennsylvania history to address critical environmental problems. Funds are available for innovative projects, energy related projects, public parks, and projects that restore, conserve and preserve our valuable resources.

CONSTRUCTION OVERSIGHT/MONITORING

WHM provides construction oversight on wetland construction, stream restoration and AMD projects for its clients. WHM ensures that all of the design parameters and QA/QC specifications are met during the construction process. WHM also has a qualified timber rattle snake biologist and bog turtle surveyor that can be used to provide construction monitoring when habitats of these two species are being encroached upon.

NUTRIENT TRADING

With nutrient loading becoming such a high priority watershed problem, WHM has experience in helping clients manage their problems with nutrient loading. These clients range from municipal waste point source dischargers to agricultural non-point source dischargers of nutrients. WHM provides answers to nutrient management for the clients. Nutrient trading becomes an option when sequestering the nutrients becomes too costly or if the client has sequestered nutrients in excess opening them to the market.

Allegheny Power – Albright-Bethelboro Transmission Line Upgrade Fayette County, Pennsylvania and Preston County, West Virginia

WHM provided a confidential Pipeline company assistance in the preparation of Water Obstruction and Encroachment Permits, Soil Erosion and Sediment Control Plans (SESC), and Threatened/Endangered Species consultation, including surveys and monitoring, in relationship to numerous Anomaly Dig Locations throughout Pennsylvania.



During these projects, WHM drafted and submitted SESC plans showing the locations of each anomaly dig and the Best Management Practices that may be used. The project also required multiple Water Obstruction and Encroachment General Permits that involved coordination with County Conservation Districts and the Pennsylvania Department of Environmental Protection (PaDEP), depending on delegation authority.

WHM performed wetland delineations of the anomaly dig locations and proposed access routes. Wetland and channel boundaries were surveyed using a Trimble GPS unit with Zephyr antenna, which post processing data has sub-foot accuracy. The survey data was then used to create detailed mapping of the wetland boundaries in GIS and AutoCAD software packages. Wetland Delineation Reports were completed to U.S. Army Corps of Engineers and PaDEP review standards.

Three types of General Permits were completed for digs involving a water obstruction or encroachments: GP-5 – Utility Line Stream Crossing, GP-8 – Temporary Stream Crossing Digs, and GP-11 – Maintenance, Testing, Repair, Rehabilitation, or Replacement of Water Obstruction and Encroachments. All necessary data and information was submitted to the DEP or delegated County Conservation District.

General Permits required Pennsylvania Natural Diversity Inventory (PNDI) coordination. Some of the locations required specific surveys for the Threatened and Endangered plant species through the Department of Conservation and Natural Resources and the Timber Rattlesnakes, which are a candidate threatened species regulated through the Pennsylvania Fish and Boat Commission (PFBC). As a result of the location of certain anomaly digs, a PFBC approved Timber Rattlesnake Biologist was required to monitor the site during construction activities. The biologist removed rattlesnakes encountered and places them far off the project site, protecting both the construction staff and rattlesnake.

WHM was able to complete the permitting endeavors in a timely fashion ensuring the construction schedule of the client was met.

***Pipeline – Water Obstruction and Encroachment Permits, Erosion & Sediment Control Plans and Threatened/ Endangered Species Consultation
Multiple Counties, Pennsylvania***

WHM provided a confidential Pipeline company assistance in the preparation of Water Obstruction and Encroachment Permits, Soil Erosion and Sediment Control Plans (SESC), and Threatened/Endangered Species consultation, including surveys and monitoring, in relationship to numerous Anomaly Dig Locations throughout Pennsylvania.



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WHM was able to complete the permitting endeavors in a timely fashion ensuring the construction schedule of the client was met.

Seismic Testing – Wetland Identification and Threatened/ Endangered Species Consultation Multiple Counties, Pennsylvania

A confidential Seismic company commissioned WHM Consulting, Inc. (WHM) to conduct several environmental surveys for the Seismic Testing Projects throughout Pennsylvania. The majority of the work was conducted within commonwealth lands which included State Game Lands (SGL) 100 and SGL 75, along with Sproul State Forest (SF), Tiadaghton SF and Moshannon SF. The studies included wetlands, and threatened and endangered plants and animal species under direction of the Pennsylvania Natural Diversity Index (PNDI). All studies were conducted by qualified wetlands scientists, botanists and biologists.



(Photo: View of Summerson Mountain near Renovo)

In July of 2010, WHM conducted a botanical survey, which involved searching the potential habitat for *Platanthera ciliaris* (yellow fringed-orchid). *Platanthera ciliaris* was not found, but the known population near the project area was identified and photographed during the blooming period.

In August of 2010, WHM performed a botanical survey in Sproul SF, in search of *Scirpus ancistrochaetus* and *Lupinus perennis* (Northeastern bulrush and wild lupine). During the survey three distinct populations of *Scirpus ancistrochaetus* were identified, while no populations of *Lupinus perennis* were found. WHM also conducted a wetland habitat avoidance survey, in which consultants traversed the seismic lines, moving source points and temporary access routes out of wetlands and water resources. WHM performed a similar task in SGL 100, by assisting our client to avoid rocky outcrops and ledges that provide potential habitat for *Neotoma magister* (Allegheny woodrat) and *Myotis leibii* (Eastern small-footed myotis).

WHM performed another A. woodrat/Small-footed bat survey with a more innovative and efficient approach for scouring a vast tract of land in Tiadaghton SF. This approach involved a helicopter survey during leaf off conditions during the fall of 2010. Potential rocky habitat areas were observed and marked with a GPS unit. The GPS points were then brought into GIS software and overlaid with LiDAR data and aerial imagery. By using the data sources, rocky habitat areas were identified and a boundary delineation was traced in GIS. The client used the created shapefiles and a 300' buffer to avoid impacts to the potential habitat. The Pennsylvania Game Commission was involved with the study and approved the innovative approach.

In 2011, WHM performed wetland habitat avoidance surveys within SGL 75 for and a woodrat/ Small-footed bat habitat survey, near Renovo in August of 2011. Also in August of 2011 WHM performed a botanical survey near Clinton Cliffs in Renovo, combing the potential habitat for *Chenopodium foggii* (Fogg's Goosefoot) and *Helianthemum bicknellii* (Bicknell's hoary rockrose), no rare plants were documented during this survey.

Little Pine Creek Stream Restoration Project Shaler Township, Allegheny County, Pennsylvania

WHM Consulting, Inc. (WHM) was retained by Penns Woods West Trout Unlimited (PWWTU) to complete a natural channel design and construct a section of Little Pine Creek that flows through Fawcett Fields Park in Shaler Township, Allegheny County, Pennsylvania.

PWWTU had received a Growing Greener Grant for the design and construction of a natural stream channel restoration project on a section of Little Pine Creek. This section of Little Pine Creek has been heavily damaged by high-flow events in the past several years. High stormwater flows have carried large amounts of sediment downstream and deposited them along the banks of Little Pine Creek within the project reach. These deposits have shifted the baseflow of the stream causing significant bank erosion in the project area.

The goal of the project was to stabilize the degraded stream segment of Little Pine Creek and improve aquatic habitat of approximately 1,000 linear feet within the Fawcett Fields Park. The design approach of the project was based on using natural stream channel design techniques and methodologies. This approach uses natural channel formation principals to provide a stable stream channel, adequate stormwater and bedload transportation routing, and improved aquatic habitat. A summary of work included: 1000' of channel reconstruction, bank stabilization, numerous in-stream rock flow structures, and riparian zone plantings.

The final project consisted of removing existing structures, constructing and maintaining approximately 1,000' of stream channel improvements on Little Pine Creek, including 5 Cross Rock Vanes, 1 Rock Bank Stabilization Toe, and 1 J-hook Log Vane.

We obtained permit approvals in a timely manner, so construction began on schedule. Through our relationships with regulators, we know how to prepare permit applications that the agencies will consider complete in the first submission.



BEFORE



DURING



AFTER

Haymaker Run Stream Restoration Project Westmoreland County, Pennsylvania

WHM Consulting, Inc. (WHM) was retained by Blazosky Associates, Inc. (BAI) to complete a natural channel design and construct a section of West Fork of Haymaker Run that flows through a residential development in the Municipality of Murrysville, Westmoreland County, Pennsylvania.

The Turtle Creek Watershed Association (TCWA) received a Growing Greener Grant and funding from private landowners for the design of a natural stream channel restoration project on a section of the West Fork of Haymaker Run. Despite zoning changes to minimize runoff from new development in the municipality, the West Fork of Haymaker Run as been severely degraded by excessive stormwater runoff. These high stormwater flows have eroded the channel as it flows through a municipal park, Bear Hollow, and a suburban neighborhood, Heather Highlands. Heavy deposits within the neighborhood have shifted the base flow of the stream, causing concern for landowners and the TCWA.

The goal of the project was to stabilize the degraded 2200' stream segment of the West Fork of Haymaker Run and improve aquatic habitat within the stream reach and further downstream. This design approach was based on using natural stream channel design techniques and methodologies. This approach uses natural channel formation principals to provide a stable stream channel and adequate stormwater and bedload transportation routing. A summary of the work included: channel reconstruction, cross rock vanes, J-hook vanes, riparian zone plantings, and channel realignment.

The final project consisted of constructing and maintaining approximately 1880 LF of stream channel improvements consisting of approximately 600LF of channel relocation, 9 rock and log cross veins, 9 log J-hook veins, 3 log grade control structures, riparian zone plantings and channel re-alignnment, all on an un-named tributary to Haymaker Run (HQ-CWF).



BEFORE



DURING



AFTER

Laurel Valley Golf Club Ligonier, Pennsylvania

WHM completed a natural channel design project on a stream running through the Laurel Valley Golf Course, saving the owners some money in the process.

One condition of the design was that the stream banks had to remain grass. This presented a challenge because grass has shallow roots and is not effective in preventing erosion. Another condition was that the channel had to complement the aesthetic of the course, which was designed by Arnold Palmer. This condition limited the approaches that could be used.



Eroding stream banks are a common problem on golf courses. Not only are they unattractive, but they can cause ponds to fill with sediment, resulting in costly dredging. Traditionally, golf courses have stabilized streams with retaining walls or wire baskets filled with rock, both of which are unsightly, expensive and prone to failure. Natural channel design is a method of restoring or creating a stable stream channel by using a natural system as a model. WHM has designed successful stream restoration projects in Pennsylvania, New York, Maryland, North Carolina and West Virginia. We offer full-service solutions that include background data collection, design, permitting and construction.

WHM's techniques transform an unappealing stream into a beautiful golf-course asset that requires little maintenance and is environmentally friendly. This is accomplished by reshaping the eroding channel into a more natural condition. We use our knowledge of natural channels to offer a cost-effective alternative to eroding waterways.

The stabilization technique we chose for the Laurel Valley project incorporated methods used in natural channel design. This approach employs stable natural channels as a model for developing channel pattern, profile and hydraulic dimensions. Another key component of this technique uses in-stream structures to protect sections of the stream that are vulnerable to erosion.

The final project consisted of grading a new channel pattern and dimensions to decrease the channel slope and bank height. This decreased the power of the stream and the potential for erosion. In addition, j-hook log vanes were installed to protect the stream's banks.

We obtained permit approvals in a timely manner, so construction began on schedule. Through our relationships with regulators, we know how to prepare permit applications that the agencies will consider complete in the first submission.

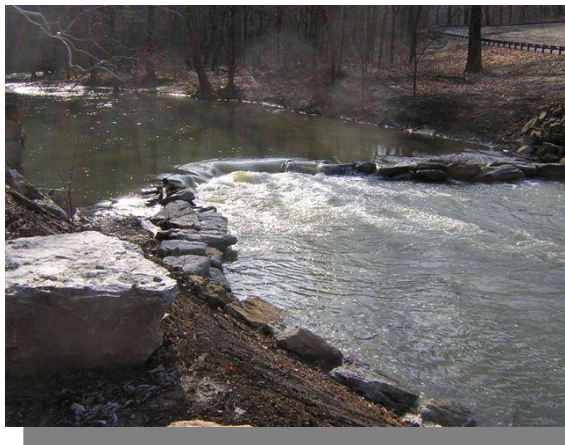
***Streambank Restoration on Cross Creek
Washington County Watershed Alliance
Washington County, near Pittsburgh, Pennsylvania***

We restored a stream using a natural channel design that's more esthetically pleasing than the wire baskets with rock employed by old-school hard engineering.

The Cross Creek project is on the site of the earliest people in North America: the Meadowcroft Rockshelter and Museum of Rural Life near Pittsburgh. Meadowcroft features a 16,000-year-old campsite alongside a village recreating rural life from the 1800s. It's a popular day trip for families, school groups and history lovers, located within an hour's drive of Pittsburgh, Wheeling, W.Va., and Steubenville, Ohio.



*BEFORE – Haphazard repair of streambank erosion;
sediment deposits in watercourse*



*AFTER – Cross-rock vane beautifully redirects flow
from stream banks*

WHM designed a large cross-rock vane to focus the flow of the stream into the middle of the channel in order to prevent bank erosion. Native trees were planted on the bank and surrounding areas.

In addition to the design, we were responsible for the permitting and construction quality assurance. Partners on the project included the Washington County Conservation District and Watershed Alliance, Cross Creek Watershed Association and Meadowcroft Rock Shelter.

The project was funded through a grant from the Growing Greener Program of the Pennsylvania Department of Environmental Protection; we prepared the successful grant application. The program represents the largest single investment of state funds in Pennsylvania history to address critical environmental concerns.

A watershed is an area of land in which all water sources flow into a common body of water. What happens in one watershed affects water quality on a much larger scale. The Cross Creek watershed is part of the

Ohio River watershed, which is part of the Mississippi River watershed, which flows into the Gulf of Mexico.

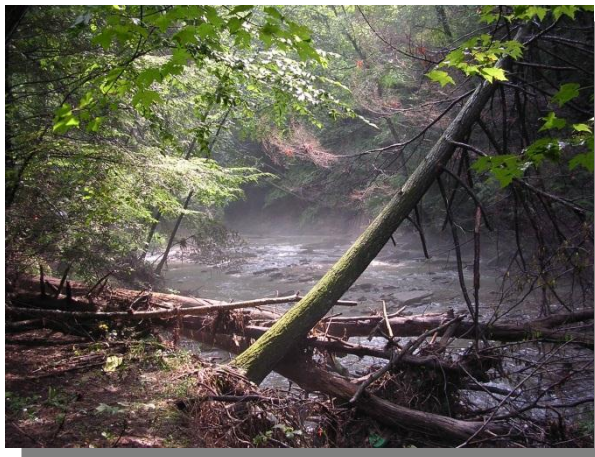
WHM was pleased to be part of a large partnership involving a significant historic site, local organizations, Washington County and the Pennsylvania Department of Transportation.

Watershed Assessment and Restoration Plan Plum Creek, near Pittsburgh, Pennsylvania

We performed an extensive assessment of the Plum Creek watershed near Pittsburgh, identifying erosion of stream banks, drainage from abandoned mines, sewage problems and other issues. We then developed a list of priority restoration projects.

"I'd like to be able to have the creeks stocked with trout for the kids," said a volunteer from the Plum Creek Watershed Association. "To get there, though, you have to start from the ground up. You can't solve the problem unless you know what's wrong."

WHM Consulting, Inc. identified the problems as well as the assets: large amounts of undeveloped land and streams that have exceptional water quality and vegetation. Our restoration plan, completed in 2006, serves as a tool for local planners, who will apply for grants to fix problems and conserve resources.



Environmental Asset along Plum Creek



Environmental Detriment along Plum Creek

D. Josh Lincoln, Chief Operating Officer, said the main recommendation was to improve water quality by managing runoff from storms. We coordinated with Plum Borough to submit a grant application to the state for examining all storm-water management facilities: ponds and basins that control runoff from development in one of the fastest growing parts of Pennsylvania.

We used field visual assessments, sampling and geographic information systems to develop our plan, which is being implemented by the Plum Creek Watershed Association – comprised of officials from Oakmont, Penn Hills, Plum and Verona. WHM's local knowledge and relationships with the Pennsylvania Department of Environmental Protection and county conservation districts served the association well, streamlining a daunting process.

The project was funded through a grant from the Growing Greener Program of the Pennsylvania Department of Environmental Protection. We prepared the grant application. The program represents the largest single investment of state funds in Pennsylvania's history to address critical environmental concerns.

MS4 Sampling Plum Borough, Pennsylvania

WHM Consulting, Inc. was hired to monitor storm sewer discharges in Plum Borough, one of the fastest growing municipalities in Pennsylvania. Polluted storm-water runoff is often transported to municipal separate storm sewer systems (what the Environmental Protection Agency calls MS4s). Ultimately, this polluted water is discharged into local rivers and streams.

Our first job was to identify approximately 400 outfalls of storm water in Plum Borough, which is in Allegheny County, near Pittsburgh. Many were difficult to find because the water flows over steep hills or into ravines through thick vegetation.



WHM is completing its fourth year of measuring the health of the watershed. We provide field screening and sampling for sewage, detergents, metals, fecal bacteria, and a variety of other contaminants/parameters. We report to the Pennsylvania Department of Environmental Protection, and those reports are then submitted to the EPA.

Our job is complex. The federal government requires states and municipalities to ensure that no sewage, chemicals or other hazardous materials leak into storm water. Common pollutants include oil and grease from roadways, pesticides from lawns, sediment from construction sites, and trash such as cigarette butts, paper wrappers and plastic bottles. Ultimately, the goal is to identify illegal or illicit discharges that may be occurring either with or without a homeowner's knowledge. When deposited into waterways through storm-sewer discharges, these pollutants can contaminate drinking water; interfere with the habitat for fish, other aquatic organisms and wildlife; and discourage recreational use of rivers and streams.

Bald Eagle Wetland Mitigation Site Centre County, Pennsylvania

Few issues have polarized the business community and environmentalists more than the balance between development and protecting wetlands. WHM has developed a highly innovative approach that creates new wetlands while allowing projects to move ahead. An example is the Bald Eagle Wetland Mitigation Site, the first of its kind in Pennsylvania.



Although avoidance of wetland damage is a goal in highway construction, some impact is unavoidable. The Pennsylvania Department of Transportation hired WHM to provide mitigation for such situations. We utilize a non-traditional methodology, assembling a team to handle everything at no risk to the client. We find a site, purchase the property, acquire the permits, deal with regulatory agencies and construct replacement wetlands – all at a per-acre fixed cost.

Through careful field and desktop evaluations, followed by numerous discussions with property owners, WHM located several potential properties in the Bald Eagle Valley in Centre County, Pa. These properties were selected based on their ability to create wetlands as determined by an examination of hydrology and soils, as well as other environmental and non-environmental factors. Larger contiguous properties create a more diverse habitat than smaller unwanted parcels. Properties that retained a high possibility of success were ranked for acquisition.

After clearances were issued and sites were selected, WHM began to create a design for the Bald Eagle project based on the overall shape of the landscape and the development of a hydrologic water budget. The concept was presented to the U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, Pennsylvania Department of Environmental Protection, Pennsylvania Fish and Boat Commission, and other state and local agencies. The final design was based on input from each of these agencies, and then used to obtain regulatory approvals necessary for the construction of wetlands.

As the project progressed, a series of construction drawings was developed, resulting in a final, detailed design illustrating phased construction activities, erosion control practices and a complete planting and re-vegetation schedule. As part of the regulatory permits and approvals, WHM developed a monitoring plan to ensure long-term site maintenance and success. Funding for the project includes provisions for ongoing and long-term management of the wetlands by a non-profit organization.

WHM will have provided PennDOT with 50 acres of wetland mitigation credits. In addition, wetland preservation, restoration and upland habitat are part of this project.

**Houtzdale Municipal Authority,
Clearfield County, Pennsylvania**

The Houtzdale Municipal Authority (HMA) needs to create additional support for their municipal water system, especially for residents with wells contaminated by acid mine drainage (AMD) from years of mining in the county.

Based on these needs, HMA developed a plan for four groundwater production wells and a surface water intake in the headwaters of Moshannon Creek. However, this portion of the stream is designated as a High Quality-Cold Water Fishery (HQ-CWF) and is listed as a Class A Wild Trout Stream. As a result of these stream designations, all wetlands associated with the stream have special protection requirements and are considered to be exceptional value (EV) wetlands.



Due to the special protection requirements, WHM was contracted to perform wetland delineations for the footprint of the new waterline system. Additionally, the investigation area was expanded to include the entire area which may potentially experience drawdown as a result of the proposed groundwater withdrawal wells. As part of this delineation WHM was to make an assessment of the functions and values of wetlands within the project area.

Prior to conducting field investigations, WHM completed a review of natural resource data associated with the project site. Specifically, WHM reviewed USGS 7.5 minute topographical mapping for Blandburg, Houtzdale, Ramey, and Tipton, Pennsylvania, one ft. contour interval aerial topographic mapping, and the U.S.D.A. Soil Conservation Service soils mapping for Clearfield County, Pennsylvania (1988). The results of this desktop analysis were used to help establish probable areas of where wetland areas could be located before conducting the field investigation portion of the project.

WHM provided HMA with a detailed assessment of the resources and worked with regulators to find a balance between delicate regulatory requirements and municipal water needs.

Engineered Rock Placement Area I-99 Acid Rock Remediation Centre County, Pennsylvania

We solved a critical environmental problem that halted construction of an interstate highway, and we did it ahead of schedule, under budget, with no risk to our client.

During construction of a key stretch of I-99 in central Pennsylvania, pyritic rock was exposed when large volumes of earth were excavated. When exposed to water, pyrite creates sulfuric acid, which contaminates water supplies, kills aquatic life, degrades concrete and corrodes steel. Iron, aluminum and other metals also are released to ground water and an environmentally sensitive watershed.



WHM was selected by the Pennsylvania Department of Transportation to develop and implement a solution for the most controversial, complex environmental problem faced by the agency: the disposition of 1.5 million cubic yards of what is often called acid rock. We proposed a turnkey solution: Using the best science, WHM would design, engineer, oversee construction, operate and monitor the success of a lined disposal site known as an engineered rock placement area.

WHM and its team secured permits, overcame public objections, presented the solution to a variety of local and state government officials, worked closely with regulators and participated in a variety of interactions with scientists and the media. The detailed design of the engineered rock placement area (or ERPA, pronounced URP-uh) incorporated landfill engineering principles including: subsurface investigations, surface water management, placement operations, infiltrate management, construction quality assurance and control, public relations, as well as monitoring, closure and post-closure plans. We did it at a fixed price, per cubic yard of material, so risks were minimized for the Department of Transportation— which had limited expertise to cope with this situation.

The WHM team selected the disposal site and constructed all layers of the lined facility. The pyritic rock was mixed with baghouse lime to neutralize the acid, then capped with a unique final cover system – a geomembrane welded to the lining system so the pyritic material is completely sealed off from the environment in a “dry tomb.” Finally, there is a unique 4-foot soil cap appropriate for native vegetation of grasses, shrubs and small trees. A thicker than normal cap (4 feet instead of 2) allows use of a more diverse native vegetation, which in turn visually blends the site into its surroundings.

Our reputation, creativity, expertise, partnerships and relationships with the Pennsylvania Department of Environmental Protection and other regulators allowed a massive project to be completed ahead of schedule and under budget. WHM continues to monitor the progress of the water quality and vegetation in the vicinity.

Warriors Mark Run Huntingdon County, Pennsylvania

ATC Associates Inc. contracted WHM Consulting, Inc. (WHM) to perform macroinvertebrate sampling and a habitat assessment on Warriors Mark Run in Huntingdon County, Pennsylvania. The stream segment was assessed in response to a motor vehicle accident which involved a spill of hazardous material the stream. The study involved charactering the stream segment upstream, downstream and within the area where the spill occurred (impact zone) to determine potential impacts from the spill. WHM performed all work in accordance with the outlined Pennsylvania Department of Environmental Protection (DEP) Protocol, "Standardized Biological Field Collection and Laboratory Methods" and "Index of Biological Integrity for Wadeable, Freestone Streams in Pennsylvania" to complete the assessment and survey.



These guidance documents outlined field procedures used to conduct the habitat assessment, collect macroinvertebrate, and procedures to perform laboratory methods and identification. The habitat assessment conducted characterized the stream segments and provided insight on the various physical conditions of the stream within the stream reach, such as embeddedness and riffle/run prevalence. Sampling of the macroinvertebrates followed the Semi-Quantitative Method using a D-frame net. Macroinvertebrates were identified to the genus species, in most case. This data was used to determine an Index of Biological Integrity (IBI), developed by DEP, was determined based on six different biological metrics calculated for each assessed stream segment. The IBI was used to determine if stream has been impacted from the spill based on the upstream IBI scoring. Based on the IBI and habitat assessment, there is has been no negative ecological impact on Warriors Mark Run.

***Dayton Dam Removal Project
Rush Township Centre County, PA***

This dam removal design was completed through a grant received by Clearwater Conservancy and the Pennsylvania Fish and Boat Commission. Additional funding was contributed by the Pennsylvania Department of Transportation (PennDOT) for habitat improvements for the section of stream to be reconstruction after the dam was removed. The habitat improvement was used for compensatory mitigation for a road project. The WHM/BAI Team was retained to complete the design, permitting, and construction.



BEFORE

Mapping was performed by The WHM/BAI Team. The design included a drawdown permit, sediment analyses and an erosion control Plan. The primary objective of this design was to re-establish the historic floodplain to pre-dam conditions. In addition the design also will restore stream habitat and ecosystem functions and improve water quality. The stream channel design incorporates cross log vanes and other natural channel design installations. The hydrology and hydraulics for the project was performed in conjunction with Blazosky Associates Inc.



DURING

The WHM/BAI Team and Aquatic Resource Restoration Company completed the construction of the project in a two weeks time frame. The equipment used for the project was a John Deere 750 wide track dozer and John Deere 270LC excavator with a progressive link hydraulic thumb. The initial phase of the project consisted of drawing the dam down so that the sediments behind the dam could drain. The site was then allowed to drain for 3 days. The dam embankment was then removed. The dry soils from the dam embankment were placed over the wet backwater sediments. The dry material was critical for the access of the equipment to shape the channel without becoming stuck. Once the channel was shaped cross log vanes were installed for grade control and in stream habitat.

The Post construction planting is scheduled for the fall of this year and will include vegetation which mimics the surrounding Moshannon State Forest. Native species are the targeted for their ability to survive within the valley in addition to matching the natural habitat.

McCoy-Linn Dam Stream Restoration Project Spring and Boggs Townships, Centre County, PA

The McCoy-Linn Dam was removed to allow for fish passage throughout the lower reaches of Spring Creek, a high-quality cold water fishery. Once the dam was removed, remnant sediments remained on the banks and the creek flowed through a constricted channel. The stream had high water velocities throughout the reach as a result of the narrow channel. Erosive conditions existed throughout the reach due to the high water velocity, contributing sediments into the Spring Creek watershed. The Pennsylvania Fish and Boat Commission and a not-for-profit organization retained WHM to design a stream channel that stabilize the banks throughout the reach and design a channel that better suits the site needs.



Site surveying and mapping was performed by WHM together with BluAcres, LLC to base the design of the stream channel. The site survey gathered information of the existing conditions and various stream channel features that are necessary in the design portion of the project.

The final design of this stream reach creates a stable stream segment with rock vanes that stabilize the stream bed and banks. Wood structures are to be placed throughout the reach within the stream channel to add additional habitat for aquatic species. Both the rock and wooden structures increase the habitat within the stream, which promotes a healthy aquatic community. In addition, a riparian planting creates streamside habitat that formerly was not present while the dam existed.

An improved aquatic and riparian habitat exists at the former dam location. The healthy stream reach not only benefits aquatic and terrestrial species, but increases the recreational opportunities throughout for anglers and boaters alike. WHM was able to complete all necessary measures for this project quickly in order to fulfill the clients needs to reconstruct this portion of Spring Creek.

L.K. Metzger Dam Rehabilitation Project Ferguson Township, Centre County, PA

A private landowner had a desire to repair and make necessary upgrades to the 2.0 acre Class C dam on his property. After receiving an inspection report from the DEP, the landowner contacted WHM to provide him with services to rehabilitate and upgrade the dam. The project will improve water quality in Spruce Creek by bank grading reducing erosion and sedimentation. The project will also improve safety and aesthetic value of the dam providing needed upgrades to ensure a properly functioning and aesthetically pleasing dam for future generations.



The project addressed concerns in the DEP inspection report and other goals set forth by the landowner. A summary of work includes: the repair of the primary spillway, backfill animal burrows or holes and patch with low permeability soil (LPS) to prevent seepage, grading and armoring the banks surrounding the impoundment to prevent erosion, dredging, backfilling downstream face of dam to eliminate backwater area, and the installation of a bridge spanning spillway to allow access to north side of landowners' property..

During the design and permitting process, the following work was performed:

- Set up and attend a pre-application meeting with regulatory agencies to review project goals;
- Prepare appropriate permit applications required by regulatory agencies;
- Assist with field topographic survey;
- Conduct bathymetric survey;
- GIS and CAD mapping;
- Review of PNDI (Pennsylvania Natural Diversity Index) for threatened and endangered species and review of cultural resources; and
- Develop plans for construction including, grading, spillway and bridge design, erosion and sediment control, cut and fill volumes.

The completed permits are currently being reviewed by the PaDEP and pending approval. WHM has maintained close contact with the client to suit his need. Construction of the rehabilitation project will begin in the Spring of 2010.

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